



Amflow®

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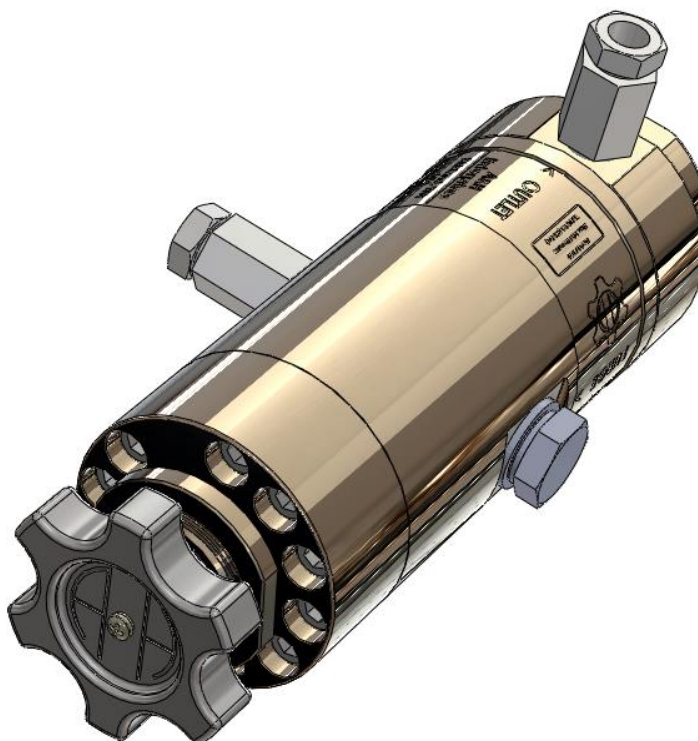
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INSTALLATION & SERVICE MANUAL

AMFLOW® AM7B-SSSP Flow Control Valve



Part Number: 00000576-0501



NOTE

Reference the "As Built" data sheet supplied with order for specific valve configuration.

Explanation of Graphic Symbols



DANGER AND/OR WARNING

The exclamation point within an equilateral triangle surrounded by red is intended to alert the user to the presence of important operating and maintenance instructions that may cause personal injury or harm to the system.



CAUTION AND/OR IMPORTANT

The exclamation point within an equilateral triangle that is solid yellow with an exclamation point is intended to alert the user to use caution or contains important information.

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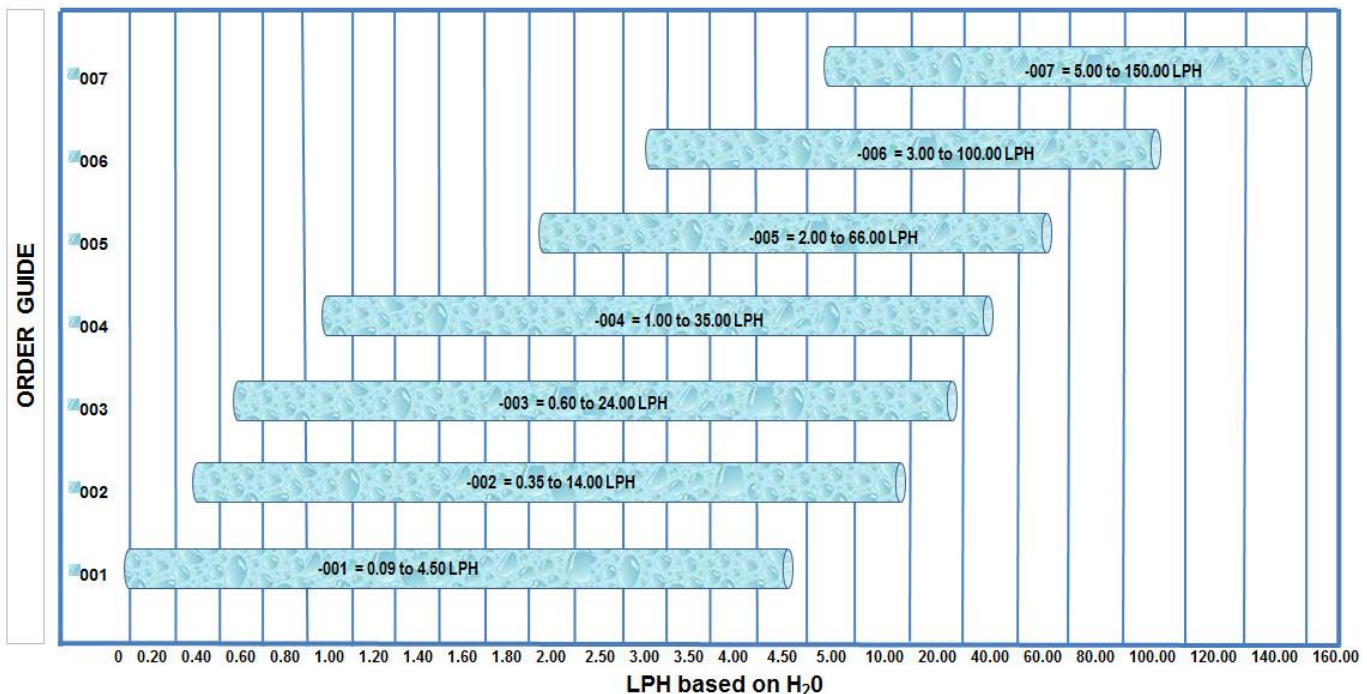
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SECTION 1: INFORMATION

1.01 DESCRIPTION

The **Amflow**® AM7B-SSSP Flow Control Valve is an adjustable device for flow regulation from 0.09 to 150 LPH. It is easily adaptable for automation.



The **Amflow**® AM7B-SSSP Flow Control Valve, for top side adjustment, designed to be mounted in a stainless steel panel with a minimum thickness of 2mm. The mounting hole should be from 34mm to 38mm in diameter. Alternatively, it may be used with a standard Class 1 ROV Bucket modified with a proprietary **Amflow**® clutch mechanism for sub-sea adjustment.

Incorporated into the **Amflow**® AM7B-SSSP Flow Control Valve is a purge port that allows the user to direct a high flow stream of chemical across the fixed orifice in order to flush any chemical residue that might accumulate over time. This feature reduces the necessity of opening the valve and cleaning the jet manually. The purge port is plugged for sub-sea usage.



1.02 DESIGN FEATURES

- Construction: 316L Stainless Steel
- Operating Pressure: 20-bar (300 PSI) to 690-bar (10,000 PSI)
- Operating Temperature: -15°C (5°F) to 200°C (392°F)
- Standard Inlet & Outlet Ports: SF375CX
- Turndown Ratio: Up To 40:1 at 10-bar Δp
- Weight: 8.6 lbs. (3.9 Kg)
- Ceramic components for high pressure control
- Low maintenance
- Very low torque is required for adjustment
- Designed for either “Top Side” or “Sub-Sea” adjustment.
 - “Top Side” is a panel mount with an adjustment knob for top side adjustment.
 - “Sub-Sea”, also designed for sub-sea operation panels, is designed for a standard Class 1 ROV Bucket modified with a proprietary **Amflow**® clutch mechanism with a 25 mm drive shaft for sub-sea adjustment.
- ❖ The ROV bucket(s) may be provided by either the customer or **Amflow**® for modification.

1.03 SAFETY INFORMATION



SAFETY INFORMATION

Usage

- Use valve only within range of pressure and temperature conditions indicated on product data sheet.
- Do not use with chemicals which are incompatible with 316L or with seal materials.
- Equipment is certified for Group 2 Category II.
- Equipment should not be used in systems requiring a higher level of certification.

Faults and Damage

The safety features and integrity of valve may be compromised by any of the following:

- External damage to valve body.
- Exposure to pressure loads in excess of maximum rated pressure.
- Maintenance performed by improperly trained personnel.

Protection from Pressure Releases

- To avoid injury due to release of high pressure, use only adaptors and fittings rated to withstand appropriate pressure.
- Confirm that all adaptors and fittings are securely connected.
- To avoid a violent release of pressure, slowly bleed off pressure before attaching or removing valve from pressure line.

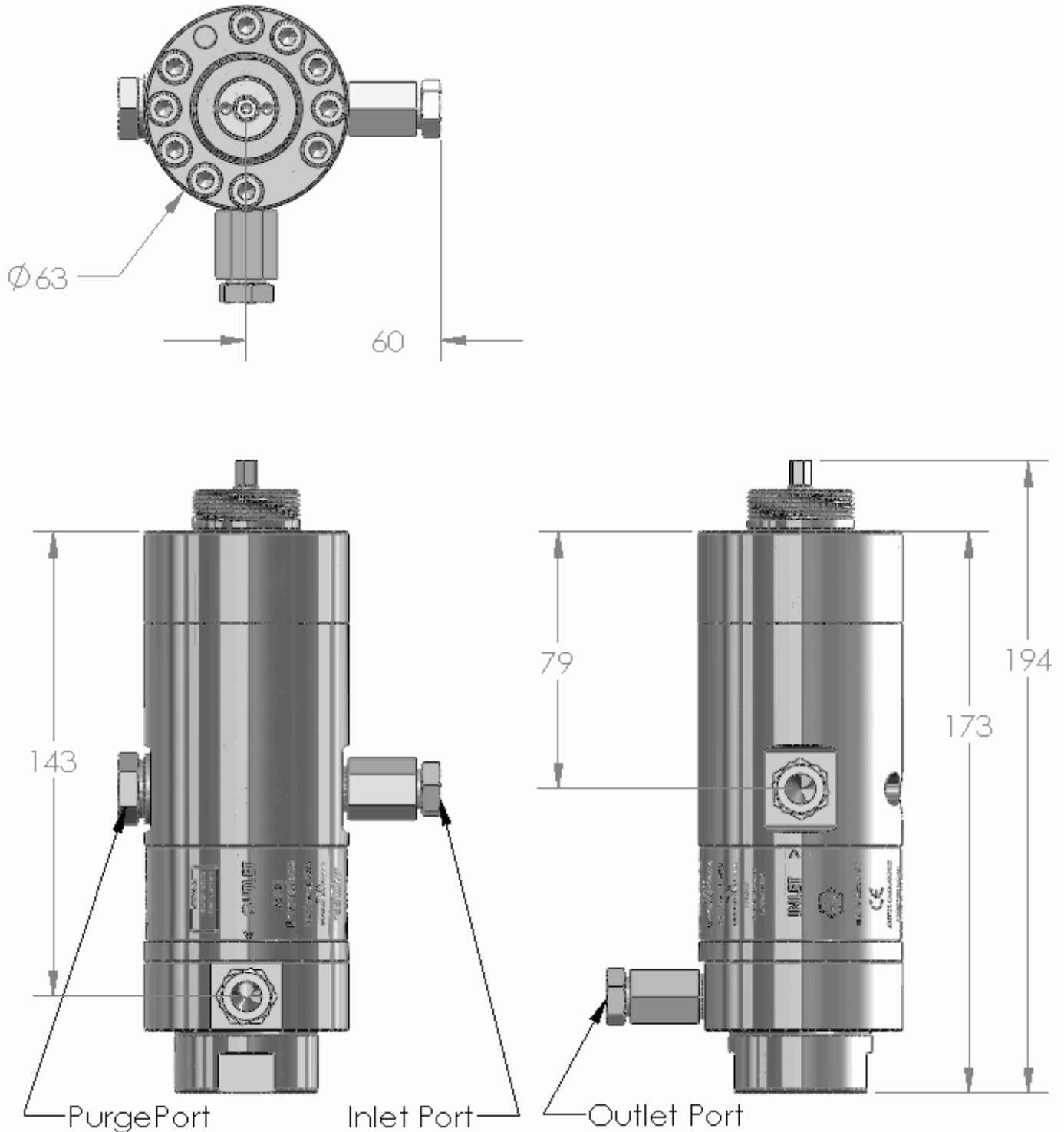
Avoid Mechanical Damage

- Caution must be observed to not damage any threaded components during maintenance procedure. Such damage could compromise the pressure safety factor of valve.
- When replacing seals, care must be used to avoid damage to sealing surfaces. Damage could lead to a sudden release of pressure during operation of valve.
- Any time the ten (10) M6x20 (Item 5) or M6x25 (Item 4) SHCS are loosened or removed they should be tightened to the appropriate torque setting of 120 inch lbs. (13.6N.m) upon replacement.

END OF SECTION

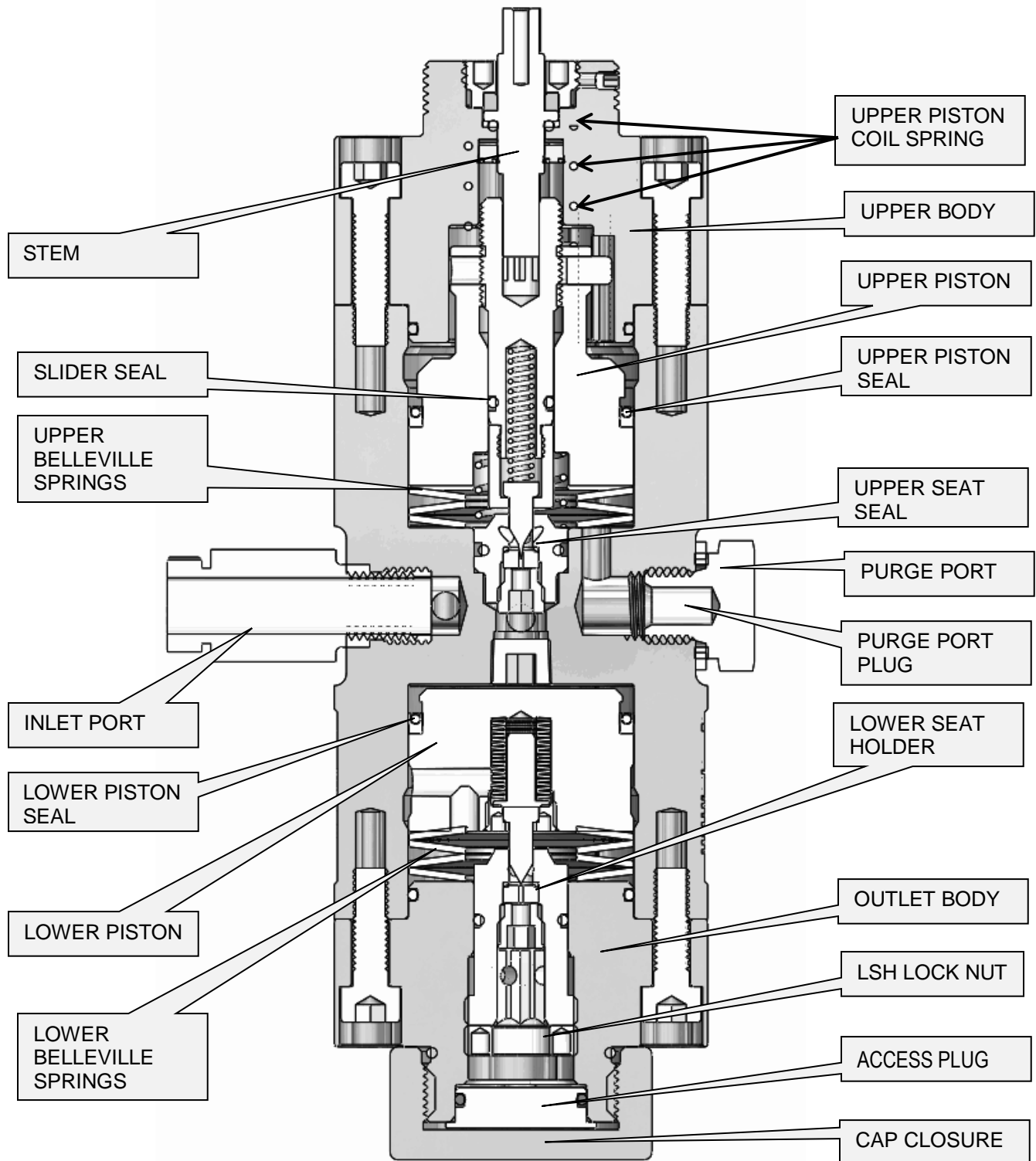


1.04 GA DRAWING: Sub-Sea



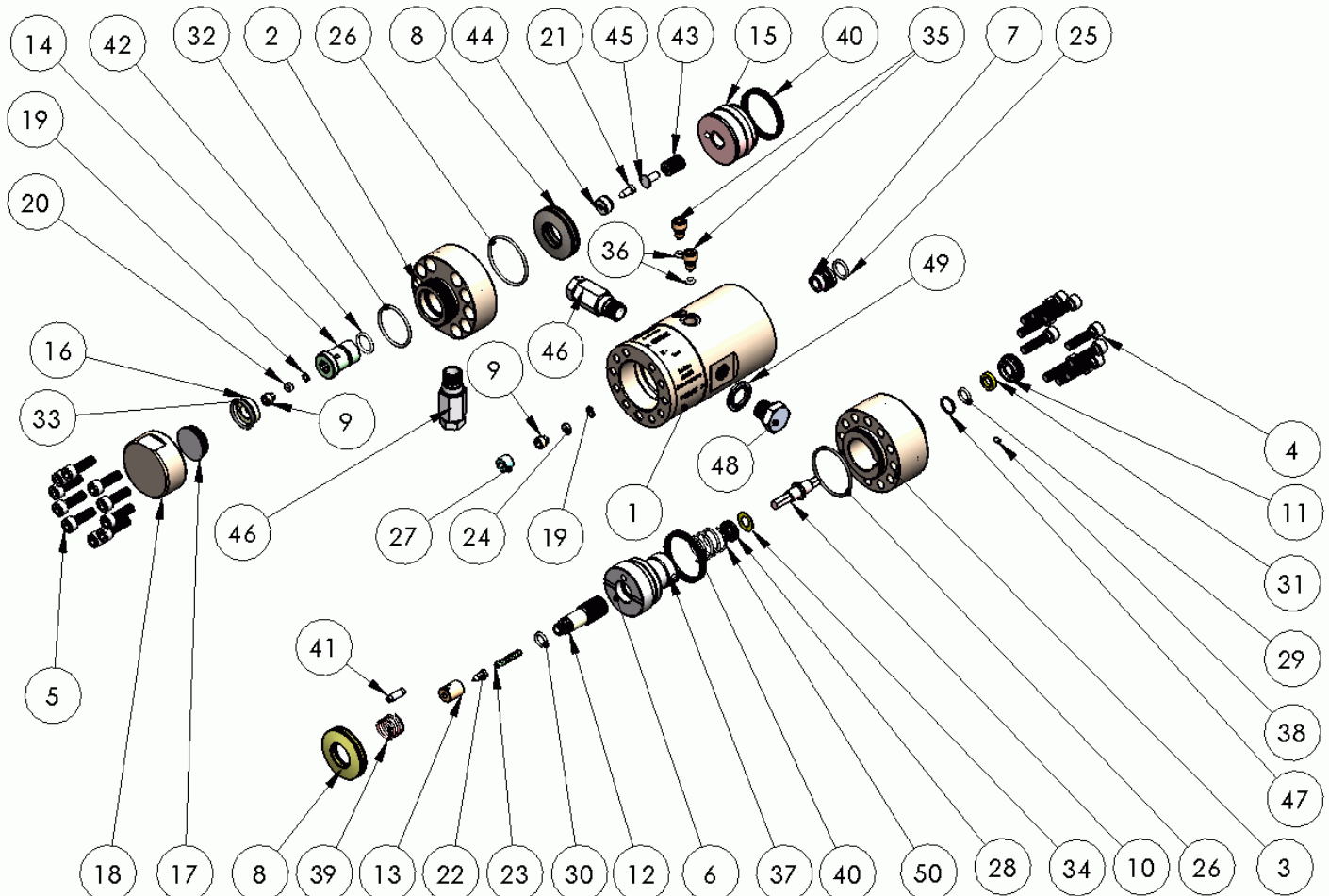


1.04a CUT-AWAY VIEW – Full Assembly: Sub-Sea





1.04b EXPLODED VIEW – Full Assembly: Sub-Sea



1.04c BOM – Full Assembly: Sub-Sea

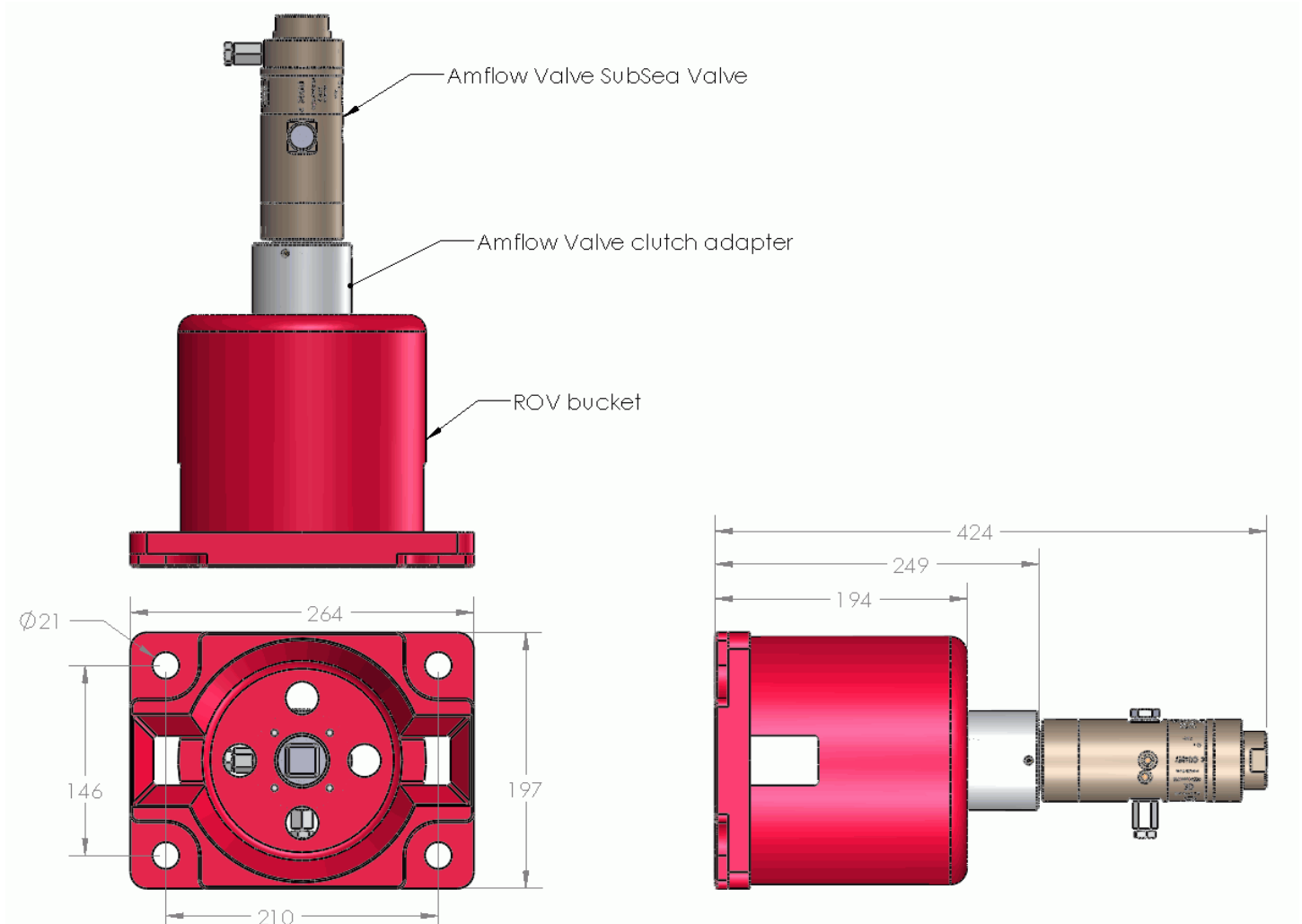
ITEM	PART	DESCRIPTION	QTY
1	00000123-0301-001	Center Body	1
2	00000125-0301-001	Outlet Body	1
3	00000124-0301-000	Upper Body	1
4	00001500-7006-025-00	M6x25 SHCS	10
5	00001500-7006-020-00	M6x20 SHCS	10
6	00000132-0301-XXX	Upper Piston	1
7	00000083-0301-001	Upper Seat Holder	1
8	00001600-1500-045-00-0755	Belleville Spring	7
9	00000094-0301-001	Seat Retainer	2
10	00000127-0301-000	Stem	1
11	00000129-0301-000	Stem Retainer	1
12	00000136-0301-001	Slider	1
13	00000137-0301-000	Pin Retainer	1
14	00000142-0301-000	Lower Seat Holder	1
15	00000140-0301-000	Lower Piston	1
16	00000153-0301-000	LSH Lock	1
17	00000144-0301-000	Access Plug	1
18	00000145-0301-000	Cap Closure	1
19	00000092-0301-002	Seat Seal	2
20	00000093-0301-XXX	Upper Seat	1
21	00000054-0301-XXX	Lower Pin	1
22	00000054-0301-XXX	Upper Pin	1
23	00000138-0301-000	Upper Pin Spring	1
24	00000093-0301-XXX	Lower Seat	1
25	00001555-2013-003	Upper Seat Holder O-Ring	1
26	00001555-2028-103	Body O-Ring	2
27	00000030-0301-000	1/8 NPT Plug	1
28	00000009-0301-000	Stem Cup Seal	1
29	00001555-2011-003	Stem O-Ring	1
30	00001555-2011-104	Slider O-Ring	1
31	00001056-0301-000	Stem Retainer Bearing	1
32	00001555-2024-000	Cap Closure O-Ring	1
33	00001555-2018-103	Plug Access O-Ring	1
34	00000128-0301-000	Stem Washer	1
35	00000118-0301-000	Port Access Plug	2
36	00001555-2006-003	Port Access Plug O-Ring	2
37	00000135-0301-000	Anti-Rotate Pin	1
38	00001500-7303-004-00	M3 x 4 Setscrew	1
39	00000149-0301-000	Piston Coil Spring	1

ITEM	PART	DESCRIPTION	QTY
40	00000146-0301-002	Piston Cup Seal	2
41	00000516-0401-000	Jet Assy	1
42	00001555-2014-003	Lower Seat Holder O-Ring	1
	00001555-2013-003	Lower Seat Holder Guide	1
43	00001997-0301-000	Lower Piston Spring	1
44	00000549-0301-000	Lower Piston Pin Enclosure	1
45	00001923-0301-000	Lower Pin Spacer	1
46	00001799-0301-000	1/4" BSPP Adaptor	3
47	00000580-0301-000	Seawater Ring	1
48	00001157-0301-000	Spring Retainer/Plug	1
49	00000582-0301-000	1/4 BSPP Gasket	1
50	00001927-0301-000	Upper Piston Coil Spring	1

END OF SECTION

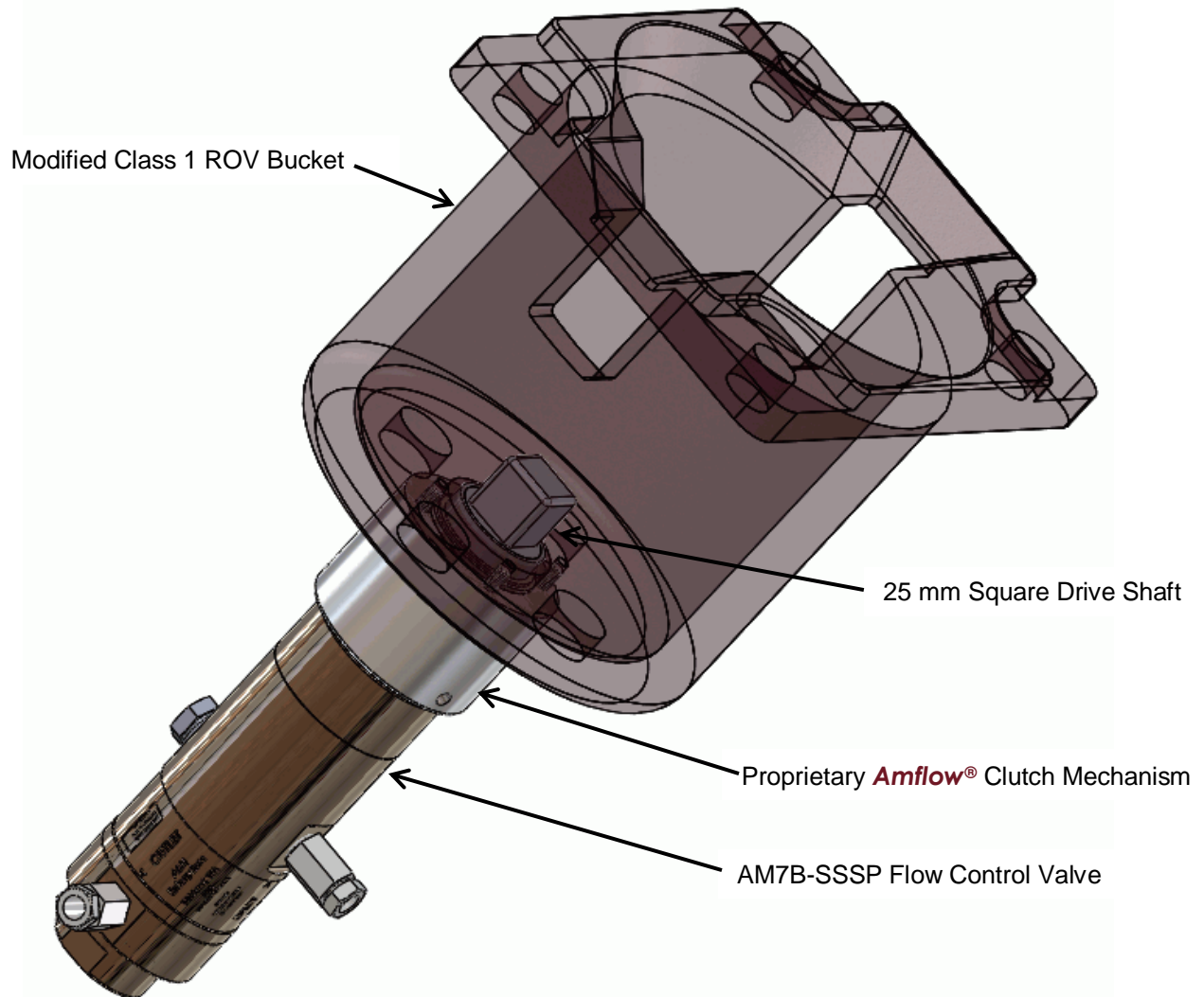


1.05 SUB-SEA: ROV Bucket with AM7B-SSSP



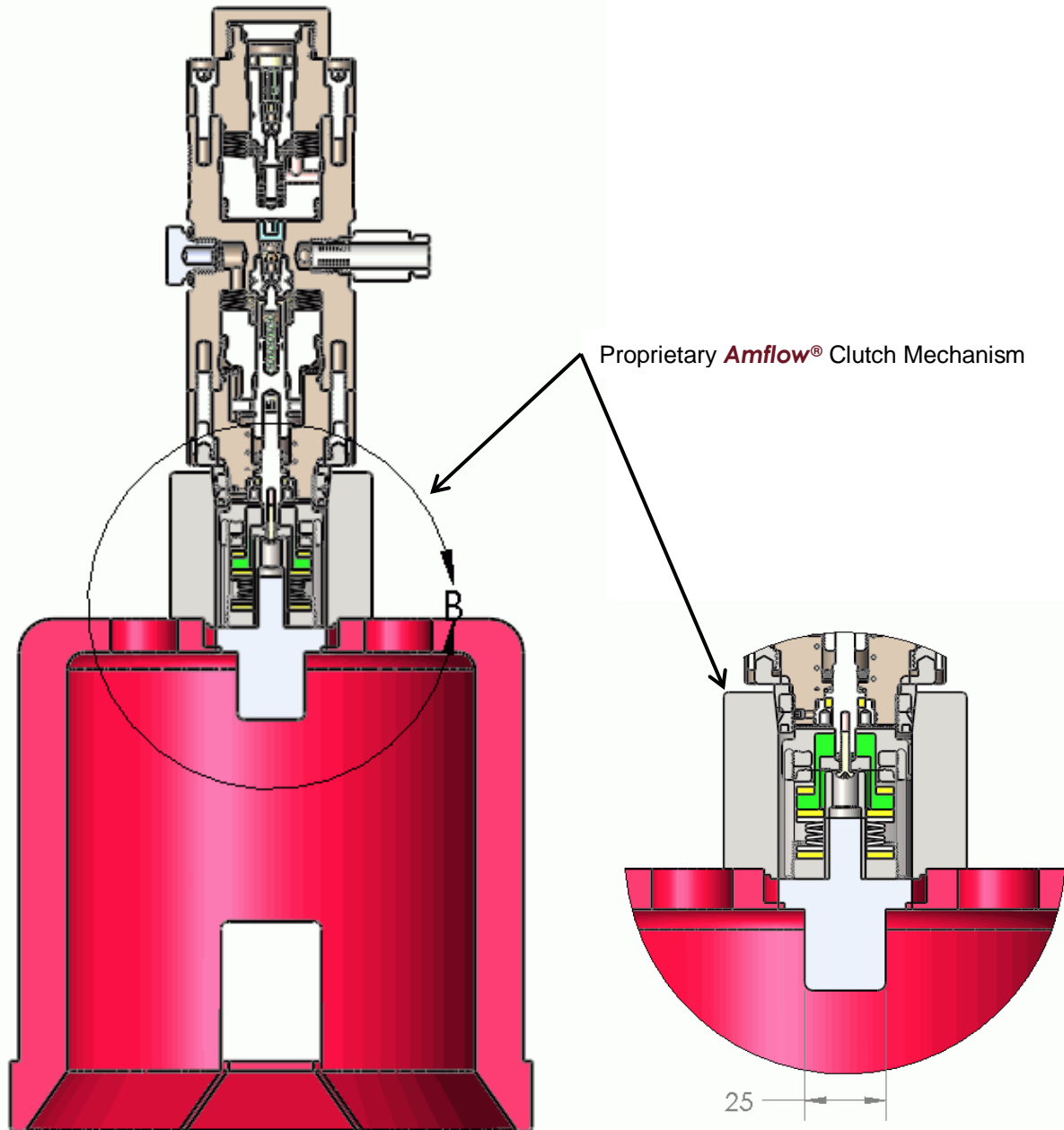


1.05a SUB-SEA TRANSPARENT VIEW: ROV Bucket with AM7B-SSSP





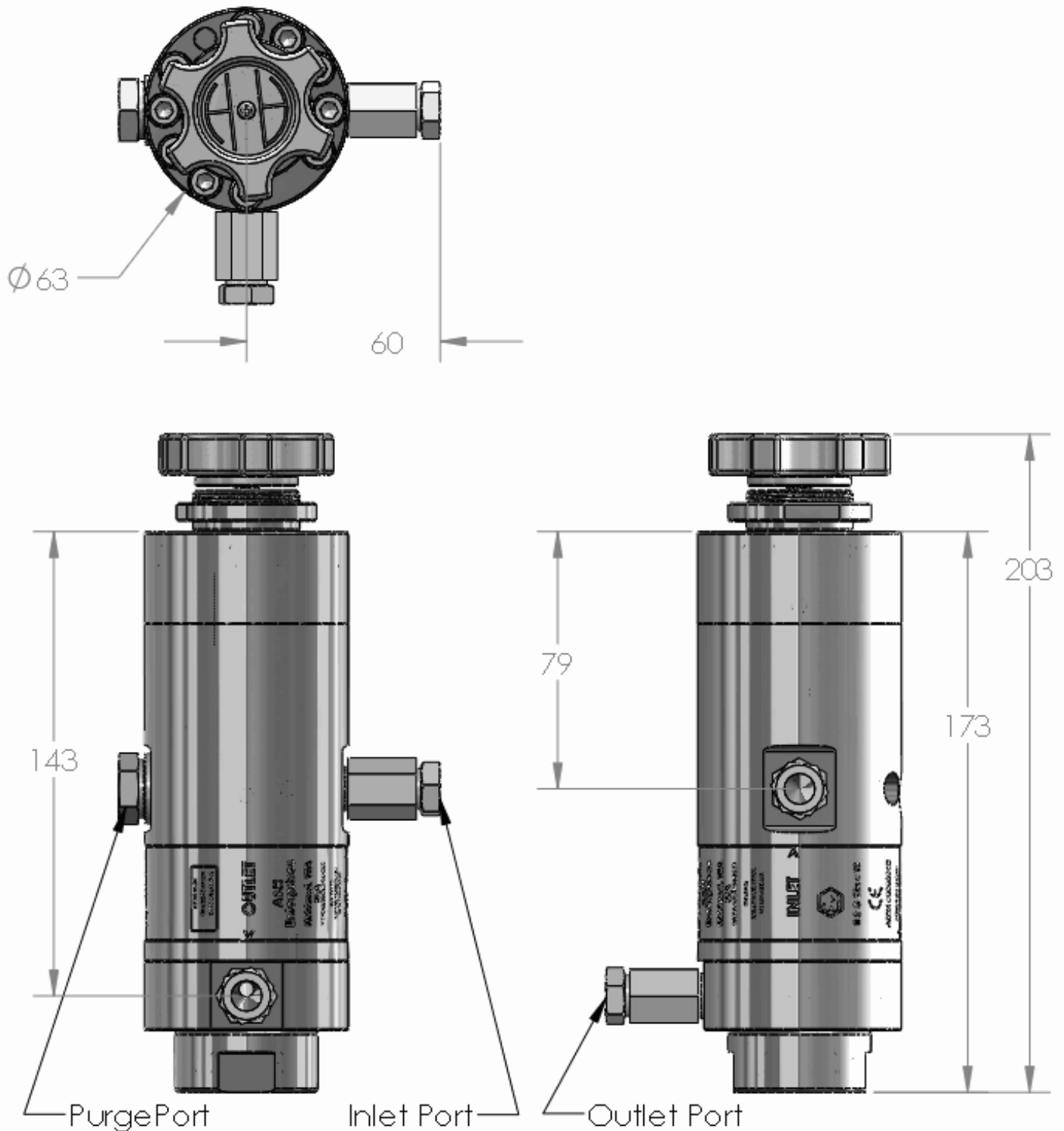
1.05b SUB-SEA CUT-AWAY VIEW: ROV Bucket with AM7B-SSSP



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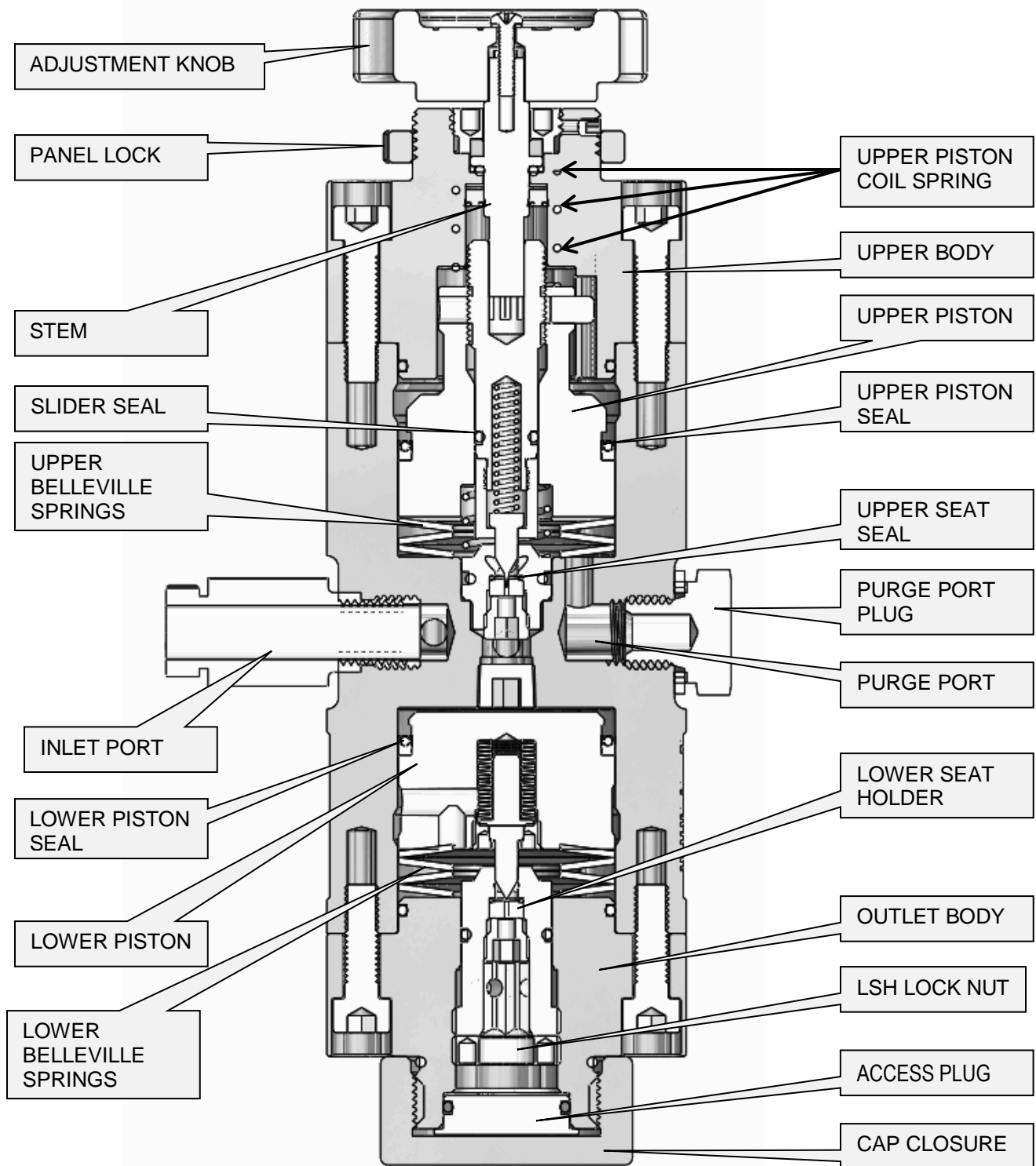


1.06 GA DRAWING: Top Side



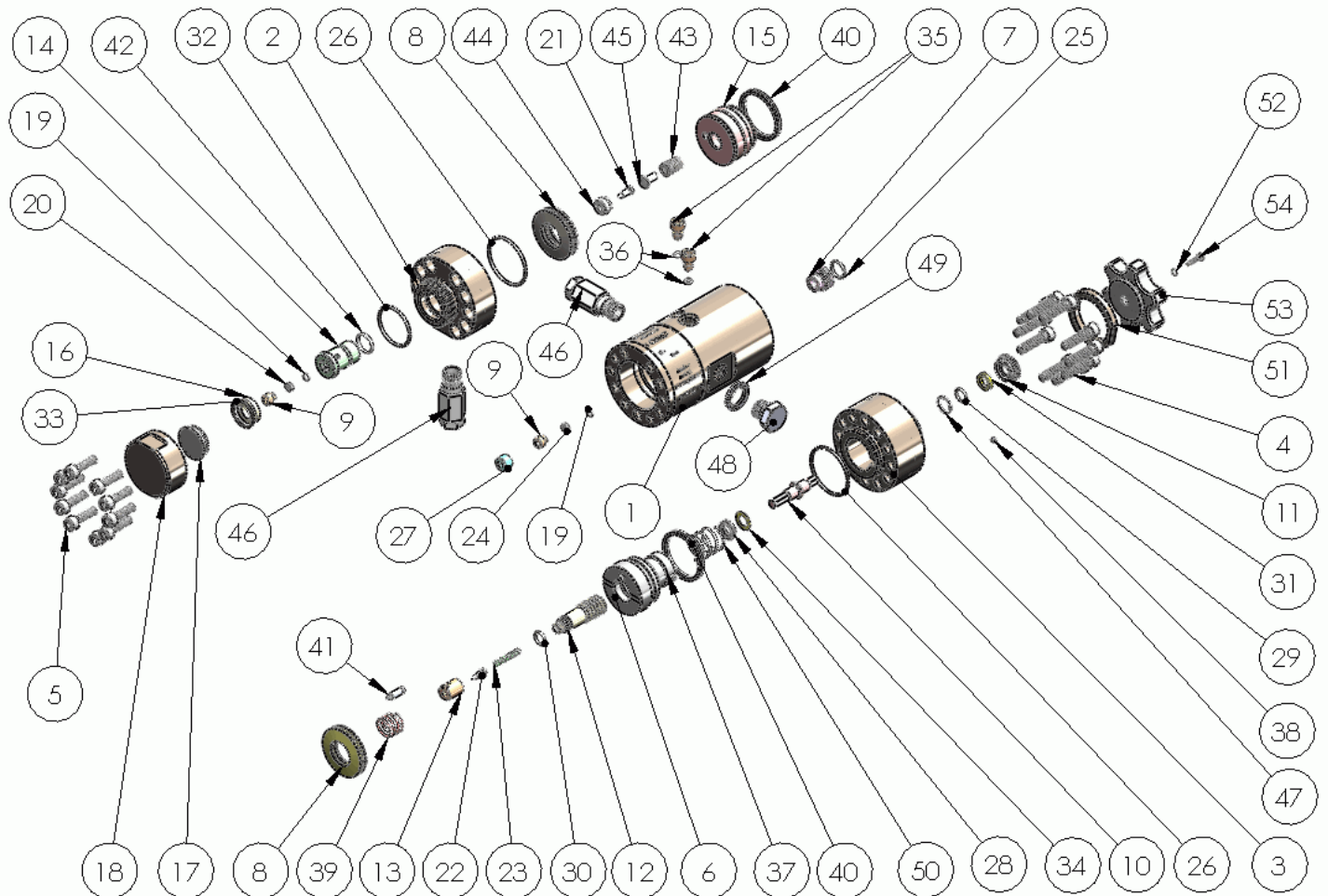


1.06a CUT-AWAY VIEW – Full Assembly: Top-Side





1.06b EXPLODED VIEW – Full Assembly: Top Side



**1.06c BOM – Full Assembly: Top Side**

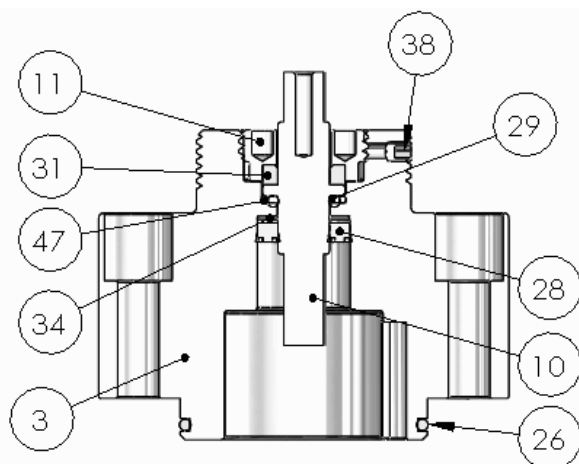
ITEM	PART	DESCRIPTION	QTY
1	00000123-0301-001	Center Body	1
2	00000125-0301-001	Outlet Body	1
3	00000124-0301-000	Upper Body	1
4	00001500-7006-025-00	M6x25 SHCS	10
5	00001500-7006-020-00	M6x20 SHCS	10
6	00000132-0301-XXX	Upper Piston	1
7	00000083-0301-001	Upper Seat Holder	1
8	00001600-1500-045-00-0755	Belleville Spring	7
9	00000094-0301-001	Seat Retainer	2
10	00000127-0301-000	Stem	1
11	00000129-0301-000	Stem Retainer	1
12	00000136-0301-001	Slider	1
13	00000137-0301-000	Pin Retainer	1
14	00000142-0301-000	Lower Seat Holder	1
15	00000140-0301-000	Lower Piston	1
16	00000153-0301-000	LSH Lock	1
17	00000144-0301-000	Access Plug	1
18	00000145-0301-000	Cap Closure	1
19	00000092-0301-002	Seat Seal	2
20	00000093-0301-XXX	Upper Seat	1
21	00000054-0301-XXX	Lower Pin	1
22	00000054-0301-XXX	Upper Pin	1
23	00000138-0301-000	Upper Pin Spring	1
24	00000093-0301-XXX	Lower Seat	1
25	00001555-2013-003	Upper Seat Holder O-Ring	2
26	00001555-2028-103	Body O-Ring	2
27	00000030-0301-000	1/8 NPT Plug	1
28	00000009-0301-000	Stem Cup Seal	1
29	00001555-2011-003	Stem O-Ring	1
30	00001555-2011-104	Slider O-Ring	1
31	00001056-0301-000	Stem Retainer Bearing	1
32	00001555-2024-000	Cap Closure O-Ring	1
33	00001555-2018-103	Plug Access O-Ring	1
34	00000128-0301-000	Stem Washer	1
35	00000118-0301-000	Port Access Plug	2
36	00001555-2006-003	Port Access Plug O-Ring	2
37	00000135-0301-000	Anti-Rotate Pin	1
38	00001500-7303-004-00	M3x4 Setscrew	1
39	00000149-0301-000	Piston Coil Spring	1

ITEM	PART	DESCRIPTION	QTY
40	00000146-0301-002	Piston Cup Seal	2
41	00000516-0401-000	Jet Assy	1
42	00001555-2014-003	Lower Seat Holder O-Ring	1
	00001555-2013-003	Lower Seat Holder Guide	1
43	00001997-0301-000	Lower Piston Spring	1
44	00000549-0301-000	Lower Piston Pin Enclosure	1
45	00001923-0301-000	Lower Pin Spacer	1
46	00001799-0301-000	1/4" BSPP Adaptor	3
47	00000580-0301-000	Seawater Ring	1
48	00001157-0301-000	Spring Retainer/Plug	1
49	00000582-0301-000	1/4 BSPP Gasket	1
50	00001927-0301-000	Upper Piston Coil Spring	1
51	00000015-0301-000	Panel Lock	1
52	00001500-8003-000-00	M3 Lockwasher	1
53	00000122-0301-000	Adjustment Knob	1
54	00001500-7103-010-00	M3x10 PH SHCS	1
55	00002091-0301-000	Lower Piston Spacer	1

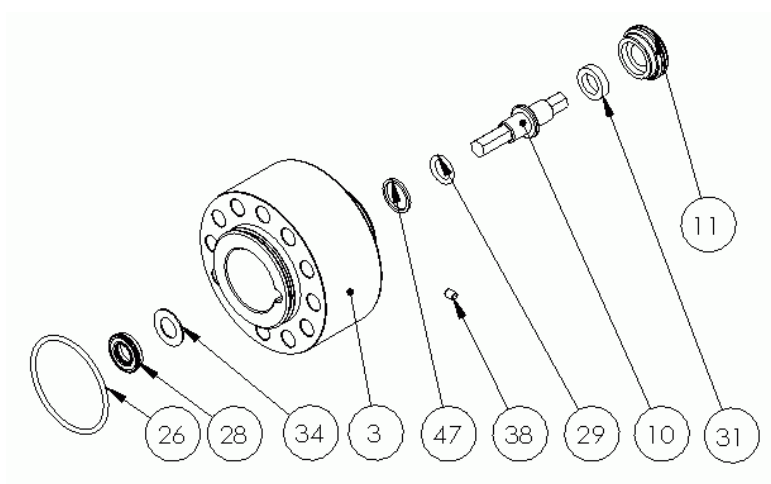
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1.07 CUT-AWAY VIEW: Sub-Assembly – Upper Body

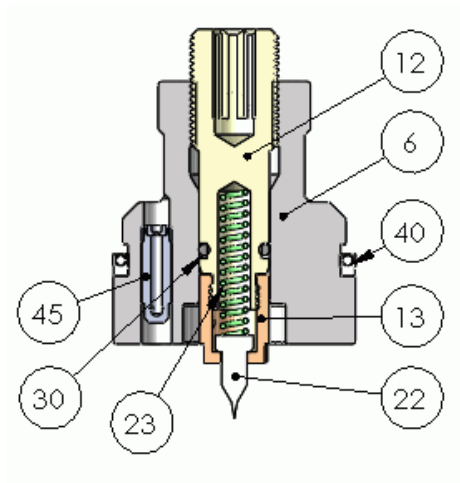
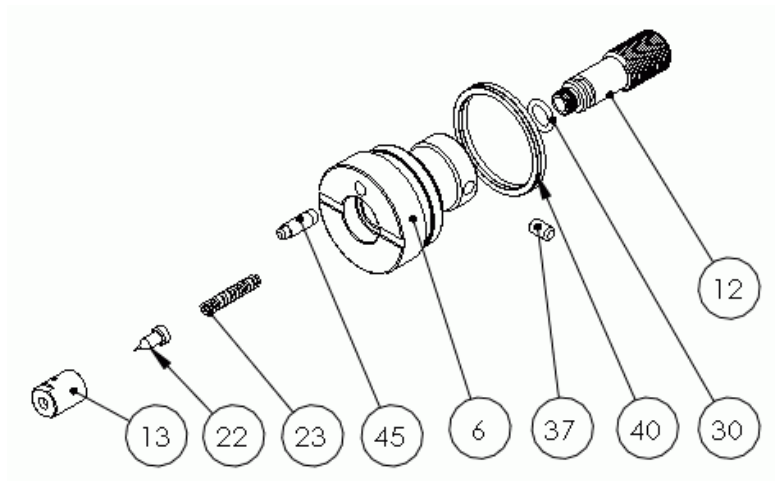


1.07a EXPLODED VIEW: Sub-Assembly – Upper Body



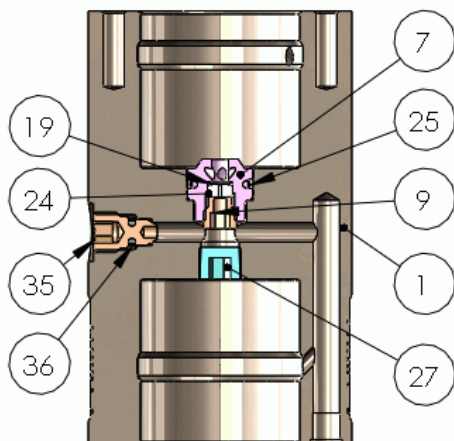
1.07b BOM: Sub-Assembly – Upper Body

ITEM	PART	DESCRIPTION	QTY
3	00000124-0301-000	Upper Body	1
10	00000127-0301-000	Stem	1
11	00000129-0301-000	Stem Retainer	1
26	00001555-2028-103	Body O-Ring	1
28	00000009-0301-000	Stem Cup Seal	1
29	00001555-2011-003	Stem O-Ring	1
31	00001056-0301-000	Stem Retainer Bearing	1
34	00000128-0301-000	Stem Washer	1
38	00001500-7303-004-00	M3x4 Setscrew	1
47	00000580-0301-000	Seawater Ring	1

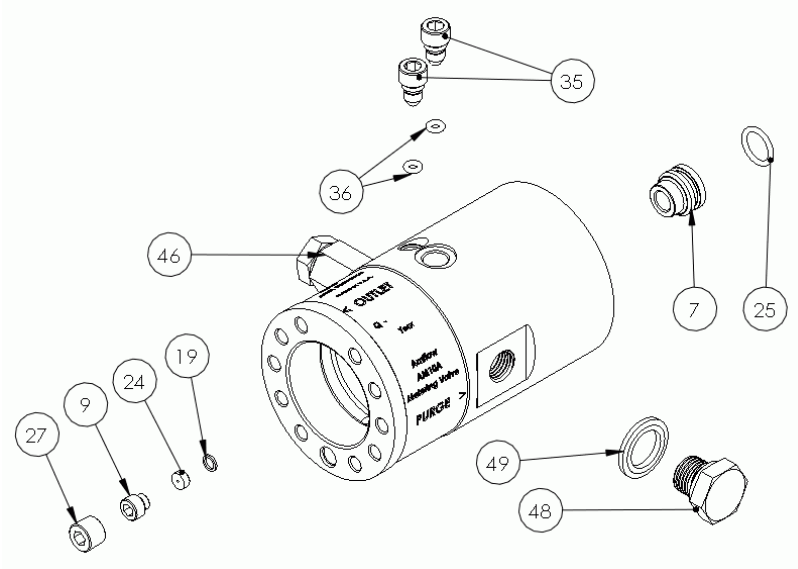
**1.08 CUT-AWAY VIEW: Sub-Assembly – Upper Piston****1.08a EXPLODED VIEW: Sub-Assembly – Upper Piston****1.08b BOM: Sub-Assembly – Upper Piston**

ITEM	PART	DESCRIPTION	QTY
6	00000132-0301-XXX	Upper Piston	1
12	00000136-0301-001	Slider	1
13	00000137-0301-000	Pin Retainer	1
22	00000054-0301-XXX	Upper Pin	1
23	00000138-0301-000	Upper Pin Spring	1
30	00001555-2011-104	Upper Slider O'Ring	1
37	00000135-0301-000	Anti-Rotate Pin	1
40	00000146-0301-002	Piston Cup Seal	2
45	00001923-0301-000	Lower Pin Spacer	1

1.09 CUT-AWAY VIEW: Sub-Assembly – Center Body



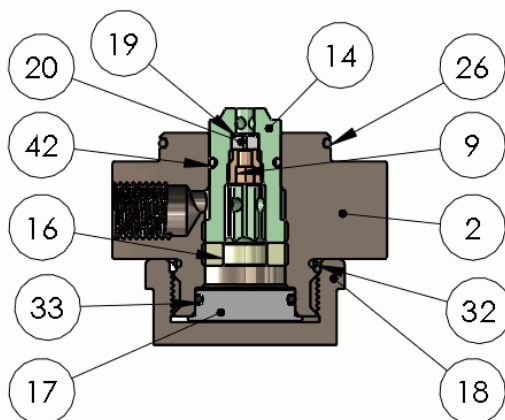
1.09a EXPLODED VIEW: Sub-Assembly – Center Body



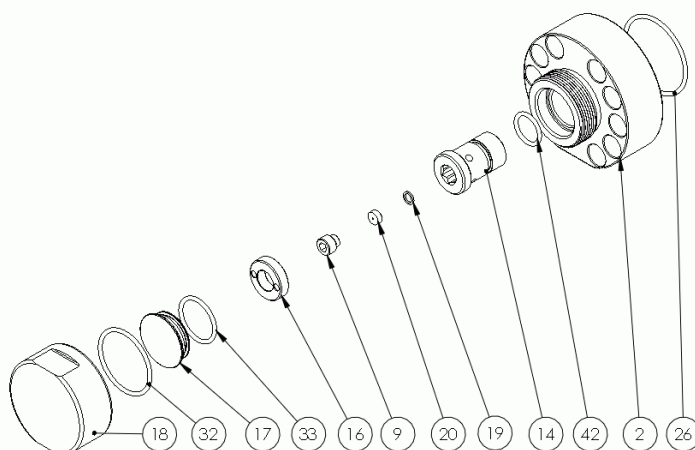
1.09b BOM: Sub-Assembly – Center Body

ITEM	PART	DESCRIPTION	QTY
7	00000083-0301-001	Upper Seat Holder	1
9	00000094-0301-001	Seat Retainer	1
19	00000092-0301-002	Seat Seal	1
24	00000093-0301-XXX	Lower Seat	1
25	00001555-2013-003	Upper Seat Holder O-Ring	1
27	00000030-0301-000	1/8 NPT Plug	1
35	00000118-0301-000	Port Access Plug	2
36	00001555-2006-003	Port Access Plug O-Ring	2
46	00001799-0301-000	1/4" BSPP Adaptor	3
48	00001157-0301-000	Spring Retainer/Plug	1
49	00000582-0301-000	1/4 BSPP Gasket	1

1.10 CUT-AWAY VIEW: Sub-Assembly – Outlet Body

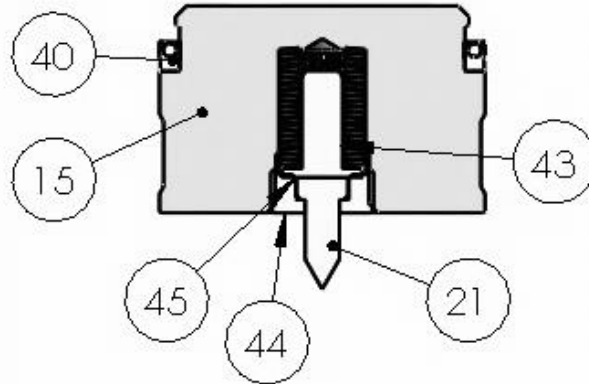
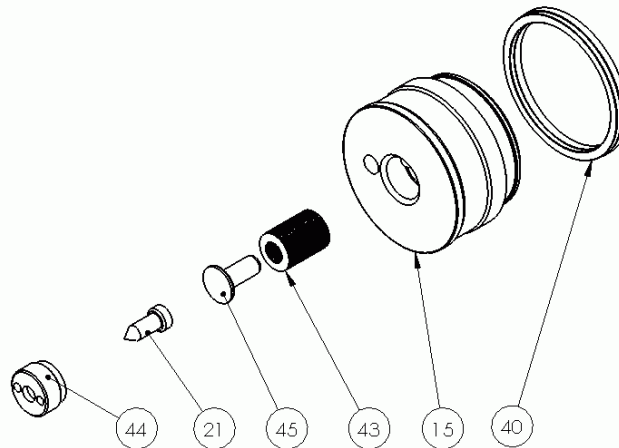


1.10a EXPLODED VIEW: Sub-Assembly – Outlet Body



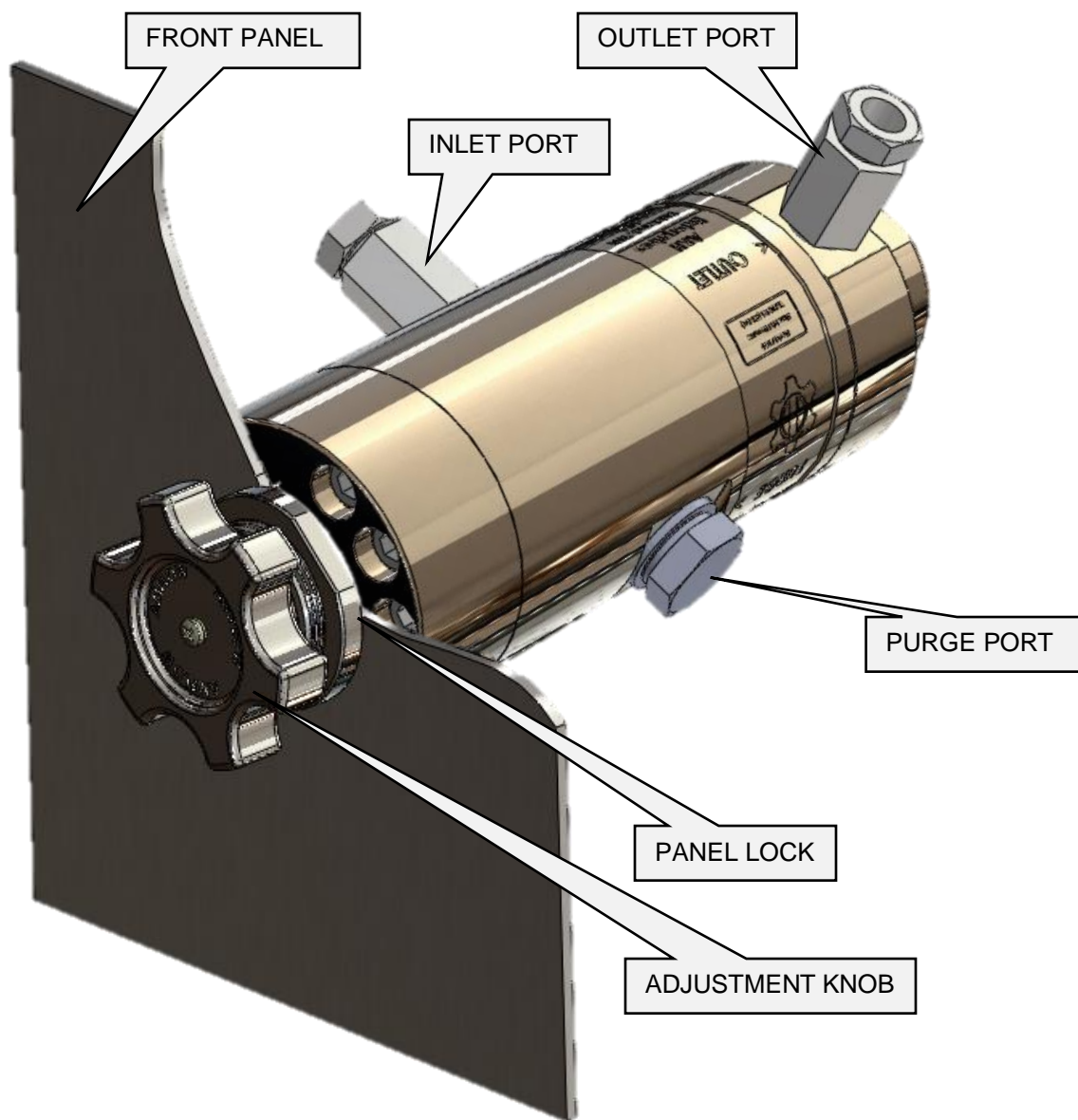
1.10b BOM: Sub-Assembly – Outlet Body

ITEM	PART	DESCRIPTION	QTY
2	00000125-0301-001	Outlet Body	1
9	00000094-0301-001	Seat Retainer	1
14	00000142-0301-000	Lower Seat Holder	1
16	00000153-0301-000	LSH Lock	1
17	00000144-0301-000	Access Plug	1
18	00000145-0301-000	Cap Closure	1
19	00000092-0301-002	Seat Seal	1
20	00000093-0301-XXX	Upper Seat	1
26	00001555-2028-103	Body O-Ring	1
32	00001555-2024-000	Cap Closure O-Ring	1
33	00001555-2018-103	Plug Access O-Ring	1
42	00001555-2014-003	Lower Seat Holder O-Ring	1
	00001555-2013-003	Lower Seat Holder Guide	1

**1.11 CUT-AWAY VIEW: Sub-Assembly – Lower Piston****1.11a EXPLODED VIEW: Sub-Assembly – Lower Piston****1.11b BOM: Sub-Assembly – Lower Piston**

ITEM	PART	DESCRIPTION	QTY
15	00000140-0301-000	Lower Piston	1
21	00000054-0301-XXX	Lower Pin	1
40	00000146-0301-002	Piston Cup Seal	1
43	00001997-0301-000	Lower Piston Spring	1
44	00000549-0301-000	Lower Piston Pin Enclosure	1
45	00001923-0301-000	Lower Pin Spacer	1

END OF SECTION

INFORMATION**1.12 CUT-AWAY VIEW: Panel Mount – Top Side****NOTE:**

Outlet port may be rotated 180°.
Please notify A&H Enterprises at time purchase order is placed.



1.12a PANEL MOUNT: Cut-out Dimensions

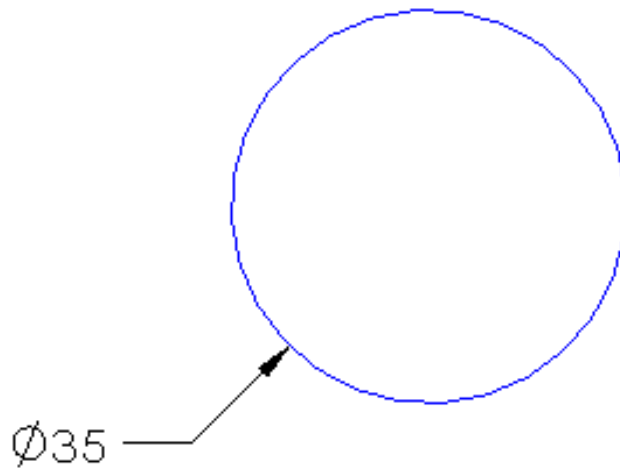


DIAGRAM 1: AM7B-SSSP Mounting Panel Opening

END OF SECTION

SECTION 2: VALVE INSTALLATION

2.01 INSTALLATION PROCEDURE: SUB-SEA

Step 1

- Screw AM7B-SSSP Flow Control Valve into the proprietary **Amflow®** clutch mechanism.



NOTE

Reference **Amflow®** ROV Bucket manual for attachment directions.

2.01a INSTALLATION PROCEDURE: TOP SIDE

ADJUSTMENT HANDLE		
51	00000015-0301-000	Panel Lock
53	00000122-0301-000	Adjustment Knob
54	00001500-7103-010-00	M3x10 PH SHCS

Step 1

- Remove ADJUSTMENT KNOB (Item 53) from valve by unscrewing M3 X 10 PANHEAD SCREW (Item 54) and LOCK-WASHER (Item 52) located in center of ADJUSTMENT KNOB (Item 53).

Step 2

- Unscrew PANEL LOCK (Item 51) from threaded neck on UPPER BODY (Item 3).

Step 3

- Place valve into prepared hole on mounting panel.

Step 4


- Replace PANEL LOCK (Item 51) and ADJUSTMENT KNOB (Item 53).



2.02 INSTALLATION PRECAUTIONS


Good system design is critical to the optimum operation of the **Amflow®** Valves. At a minimum, the design should include:

- Isolation valves located near inlet and outlet ports of the **Amflow®** Valve. (The outlet isolation valve is normally a three-way valve that can be incorporated into the calibration loop.)

 **IMPORTANT:** The importance of proper media filtering cannot be overstated. It is **strongly** recommended that filters be placed on both the suction side and the pressure side of pump. It is not unusual to have individual filters inline for each valve. The recommended micron size of the high-pressure filter is somewhat dependent on the specific configuration of any given **Amflow®** Valve. However, a 50-micron filter size is generally adequate for most applications.

- The system design should take into consideration that materials which come into contact with the injected media should not contribute to foreign matter entering into the system. This means it is unwise to use material that can be easily corroded, such as mild steels.
- A check valve located on the outlet side of each **Amflow®** Valve is strongly recommended. There are a number of reasons for this:
 - The first and most obvious is for safety considerations.
 - The second is to prevent a massive backflow through the **Amflow®** Valve.

This backflow can occur if there is a pump failure or some other system failure that would cause a loss of positive pressure across the **Amflow®** Valve. The **Amflow®** Valve is designed to accommodate some backflow conditions;

 however, piston seal damage can occur if backflow is excessive. The seal is designed to fail under certain conditions in order to prevent damage that is more serious to the valve.

END OF SECTION



SECTION 3: START-UP PROCEDURE – TOP SIDE

3.01 START-UP PROCEDURE

Step 1

- Open ADJUSTMENT KNOB (Item 53) counter-clockwise to a soft “Stop”.
 - Then, turn one (1) revolution clockwise.

Step 2

- Close Inlet Isolation valve of each valve in system.

Step 3

- Start pump and adjust system pressure to accommodate pressure requirements.
- Apply pressure very slowly upon initial valve start-up.



IMPORTANT

This is especially important for valves configured to flow less than 5 lph.



PROCEED with CAUTION

This is very important, especially at high system pressures, to prevent potential damage to seals and other internal components of valve.

Step 4

- VERY SLOWLY open Outlet Isolation Valve.

Step 5

- VERY SLOWLY open Inlet Isolation Valve. This allows fluid to be introduced gradually.
 - Once **Amflow**® Valve is filled with fluid there is little risk of damage.

Step 6

- Allow sufficient time for media to flush any trapped air out of valve.



IMPORTANT

On valves that are configured to meter less than 10 lph it is very important that at least 20 minutes be allowed for this step. Trapped air can cause the set flow rate of valve to diminish slowly.

Step 7

- Once all air is eliminated, bring system up to operating pressure.

Step 8

- Turn valve ADJUSTMENT HANDLE (Item 53) to ensure that it turns easily.

END OF SECTION



OPERATION

SECTION 4: OPERATION

A constant flow rate is controlled by maintaining a constant differential pressure across a fixed jet located within the UPPER PISTON (Item 6).

In simple terms, the pressure on inlet side of UPPER PISTON (Item 6) is offset by pressure on outlet side of UPPER PISTON (Item 6) combined with the force of BELLEVILLE SPRINGS (Item 8). The force added by BELLEVILLE SPRINGS (Item 8) is controlled by moving the SLIDER (Item 12) relative to the UPPER PISTON (Item 6) which has the effect of changing the location of the UPPER PIN (Item 22) relative to the UPPER SEAT (Item 20).

The following seals keep the process liquid pressure from escaping into the atmosphere:

ATMOSPHERIC SEALS:

- STEM CUP SEAL (Item 28) seals between STEM (Item 10) and UPPER BODY (Item 3).
- BODY O'RING (Item 26) seals between UPPER BODY (Item 3) and CENTER BODY (Item 1).
- BODY O'RING (Item 26) seals between CENTER BODY (Item 1) and OUTLET BODY (Item 2).
- PLUG ACCESS O'RING (Item 33) seals between OUTLET BODY (Item 2) and ACCESS PLUG (Item 17).

INTERNAL SEALS:

- PISTON CUP SEAL (Item 40) seals between UPPER PISTON (Item 6) and CENTER BODY (Item 1).
- UPPER SLIDER O'RING (Item 30) seals between UPPER PISTON (Item 6) and SLIDER (Item 12).
- UPPER SEAT HOLDER O'RING (Item 25) seals between CENTER BODY (Item 1) and UPPER SEAT HOLDER (Item 7).
- SEAT SEAL (Item 19) seals between UPPER SEAT HOLDER (Item 7) and UPPER SEAT (Item 20).
- PISTON CUP SEAL (Item 40) seals between LOWER PISTON (Item 15) and CENTER BODY (Item 1).
- SEAT SEAL (Item 19) seals between LOWER SEAT (Item 24) and LOWER SEAT HOLDER (Item 14).
- LOWER SEAT HOLDER O'RING (Item 42) seals between OUTLET BODY (Item 2) and LOWER SEAT HOLDER (Item 14).



IMPORTANT

When replacing any seal, the compatibility with fluid to be metered by valve must be considered.
It is strongly recommend using FFKM material.

Please consult manufacturer for further assistance.

END OF SECTION

**SECTION 5: MAINTENANCE****BEFORE CARRYING OUT NEXT ACTIONS**

1. Close down system or isolate valve to be removed.
2. Vent all pressure.

**NOTE**

For Sub-Sea installations remove valve from modified ROV Bucket and proceed to Section 6.02

5.01 VALVE REMOVAL FROM SYSTEM**Step 1**

- Disconnect tubing from Inlet and Outlet Ports.

Step 2

- Remove M3 X 10 PANHEAD SCREW (Item 54) in center of ADJUSTMENT KNOB (Item 53).

**Step 3**

- Remove ADJUSTMENT KNOB (Item 53).

**Step 4**

- Loosen PANEL LOCK (Item 51) which holds valve to panel.

**END OF SECTION**

**5.02 OPENING PROCEDURE: Valve**

Once valve is removed from system:

Step 1

- Using a 5mm T-handle, loosen ten (10) M6 X 25 SHCS (Item 4) which join UPPER BODY (Item 3) to CENTER BODY (Item 1).



Ten (10) M6 X 25 SHCS (Item 4)

Step 2

- Carefully pull apart UPPER BODY (Item 3) from CENTER BODY (Item 1).

**Step 3**

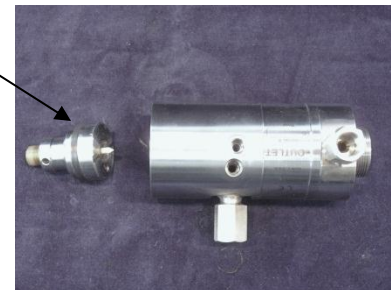
- Set aside UPPER BODY (Item 3).

Step 4

- Holding CENTER BODY (Item 1) upright; remove UPPER PISTON (Item 6) as shown below.
 - It should slide apart easily.



UPPER PISTON (Item 6)

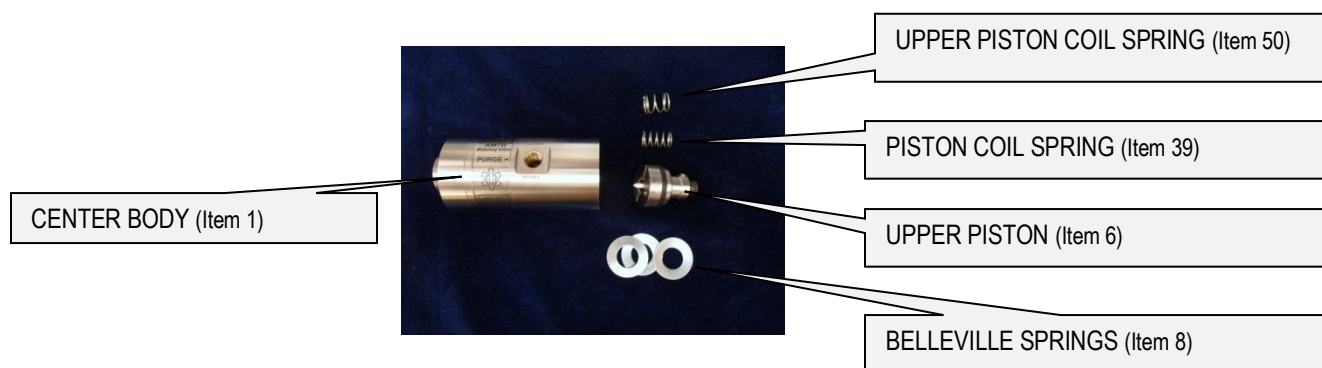
**Step 5**

- Set aside UPPER PISTON (Item 6).

5.02 OPENING PROCEDURE: Valve, continued
Step 6

- Invert CENTER BODY (Item 1) and remove BELLEVILLE SPRINGS (Item 8).

CENTER BODY		
1	00000123-0301-001	Center Body
6	00000132-0301-XXX	Upper Piston
8	00001600-1500-045-00-0755	Belleville Spring
39	00000149-0301-000	Piston Coil Spring
50	00001927-0301-000	Upper Piston Coil Spring
➤ Also, Ref. Section. 1.09		


END OF SECTION



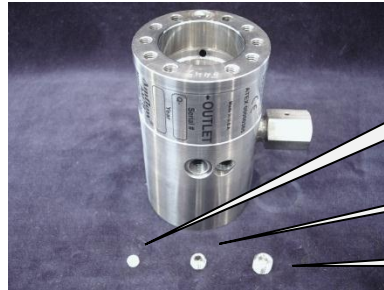
REPLACEMENTS

SECTION 6: REPLACEMENTS

6.01 REPLACEMENT: Upper Seat

**NOTE:**

Ref. Section 1.09 for parts incorporated into CENTER BODY (Item 1).



Upper Seat (Item 20)

Seat Retainer (Item 9)

1/8 NPT Plug (Item 27)

Step 1

- Using 5mm hex wrench, remove 1/8 NPT PLUG (Item 27) located in seat access port of CENTER BODY (Item 1).

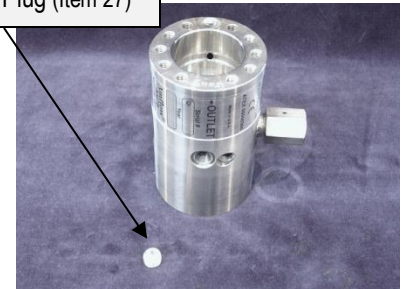
Ref. PICTURE 1, 2 & 3



PICTURE 1



PICTURE 2



PICTURE 3

Step 2

- Using 4 mm hex wrench, remove SEAT RETAINER (Item 9).

Step 3

- Remove UPPER SEAT (Item 20) and remnants of SEAT SEAL (Item 19).

Step 4

- Remove SEAT SEAL (Item 19) with sharp metal pick.

Step 5

- When reinstalling UPPER SEAT (Item 20) note that one edge is chamfered.

**NOTE**

Use Service Removable Loctite® when reinstalling SEAT RETAINER (Item 9).

**IMPORTANT****Step 5**

It is important that the chamfered edge of UPPER SEAT (Item 20) be located so that the SEAT SEAL (Item 19) will be crushed into the space between chamfer and counter-bore in UPPER SEAT HOLDER (Item 7).

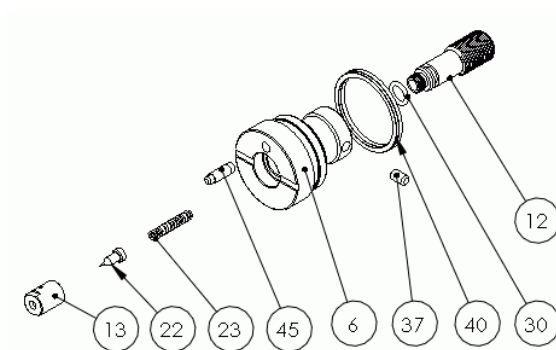
When a SEAT (Item 20 or 24) has been installed, it is necessary to remove any SEAT SEAL (Item 19) that has been extruded into the fluid passageway. This can be accomplished by using a sharp metal pick.

The SEAT SEAL (Item 19) must be replaced **each time** a SEAT (Item 20 or 24) is removed as it is designed to be crushed when a SEAT (Item 20 or 24) is installed.

END OF SECTION

6.02 REPLACEMENT: Upper Pin

UPPER PISTON			
ITEM	PART	DESCRIPTION	QTY
6	00000132-0301-XXX	Upper Piston	1
12	00000136-0301-001	Slider	1
13	00000137-0301-000	Pin Retainer	1
22	00000054-0301-XXX	Upper Pin	1
23	00000138-0301-000	Upper Pin Spring	1
30	00001555-2011-104	Upper Slider O'Ring	1
37	00000135-0301-000	Anti-Rotate Pin	1
40	00000146-0301-002	Piston Cup Seal	2
45	00001923-0301-000	Lower Pin Spacer	1
➤ Also, Ref. Section 1.08			


Step 1

- Using a 6 mm hex wrench, unscrew and remove SLIDER (Item 12) from UPPER PISTON (Item 6).


Step 2

- Once threads of SLIDER (Item 12) are disengaged from UPPER PISTON (Item 6) remove SLIDER (Item 12).
 - There will be some friction from SLIDER O'RING (Item 30).



REPLACEMENTS

6.02 REPLACEMENT: Upper Pin, continued

Step 3

- Using a 6 mm hex wrench, unscrew SLIDER (Item 12) from PIN RETAINER (Item 13).
 - (Threads are right hand.)



Step 4

- Remove UPPER PIN (Item 22) and UPPER PIN SPRING (Item 23).



NOTE

1. When assembling PIN RETAINER (Item 13) to SLIDER (Item 12), use Service Removable Loctite® for small threads.
2. Recommend that the SLIDER O-RING (Item 30) be replaced at this time.
 - Reference Instructions for replacement /service of SLIDER O-RING (Item 30) in Sec. 7.02a

END OF SECTION

**REPLACEMENTS****6.03 REPLACEMENT: Slider O'Ring****Step 1**

- Using a pick, remove old SLIDER O-RING (Item 30) from SLIDER (Item 12).
 - Put on new O-RING (Item 30).

**CAUTION**

In order that SLIDER O-RING (Item 30) is not twisted, carefully put pick between SLIDER O-RING (Item 30) and SLIDER (Item 12).

Step 2

- Use a circular motion around inside diameter of SLIDER (Item 12); this will help smooth out SLIDER O-RING (Item 30).

END OF SECTION

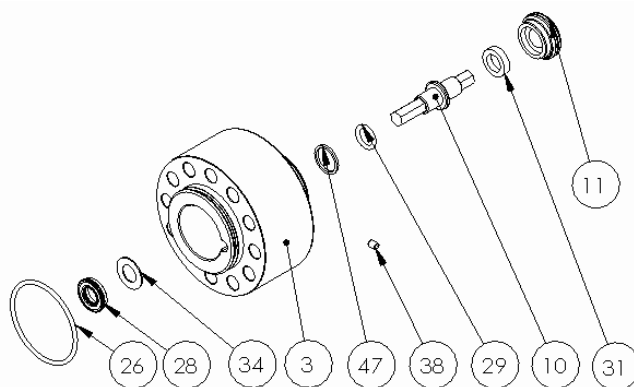
REPLACEMENTS

6.04 REPLACEMENT: Upper Body Seal, Stem O'Ring, Seawater Ring or Stem Cup Seal

CAUTION

Use care not to damage sealing surface on UPPER BODY (Item 3).
OR
 Seal groove for Upper Body STEM CUP SEAL (Item 3)

UPPER BODY			
ITEM	PART	DESCRIPTION	QTY
3	00000124-0301-000	Upper Body	1
10	00000127-0301-000	Stem	1
11	00000129-0301-000	Stem Retainer	1
26	00001555-2028-103	Body O-Ring	1
28	00000009-0301-000	Stem Cup Seal	1
29	00001555-2011-003	Stem O-Ring	1
31	00001056-0301-000	Stem Retainer Bearing	1
34	00000128-0301-000	Stem Washer	1
38	00001500-7303-004-00	M3x4 Setscrew	1
47	00000580-0301-000	Seawater Ring	1
➤ Also, Ref. Section 1.07			



6.04a REPLACEMENT: Upper Body Seal

CAUTION:

Remove and replace BODY O'RING (Item 23) taking care not to damage seal groove.

Step 1

- Push STEM CUP SEAL (Item 3) into place **after** STEM (Item 42) is re-installed.



NOTE:

To guarantee that STEM CUP SEAL (Item 3) is properly installed use special Cup Seal Tool (Part 00000009-1010-000) (Ref. Appendix A).

END OF SECTION



REPLACEMENTS

6.04b REPLACEMENT: Stem O'Ring

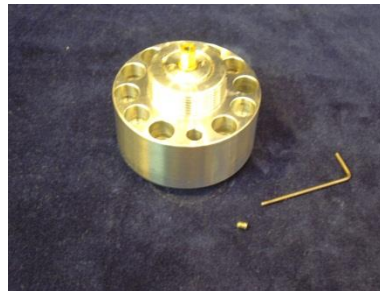
Step 1

- Using a 5mm T-handle wrench, remove UPPER BODY (Item 3) from CENTER BODY (Item 1) by loosening ten (10) M6x25 (Item 4).



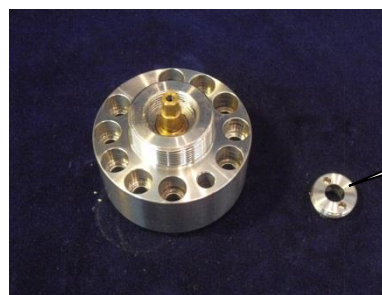
Step 2

- Remove SETSCREW M3X4 (Item 38), using a small allen wrench.



Step 3

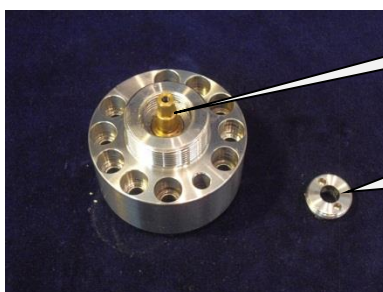
- Using Stem Retainer Removal Tool (Part 00000129-1012-000) (Ref. Appendix A), remove STEM RETAINER (Item #11).



Stem Retainer
(Item 11)

Step 4

- Press STEM (Item 10) out of UPPER BODY (Item 3).



Stem (Item 10)

Stem Retainer
(Item 11)



Stem (Item 10)

**REPLACEMENTS****6.04b REPLACEMENT: Stem O'Ring, continued****Step 5**

- Remove and replace STEM O'RING (Item 29) on STEM (Item 10).

**Step 6**

- Reverse steps 1-4 to re-assemble.

END OF SECTION**6.04c REPLACEMENT: Seawater Ring****Step 1**

- Follow Section 6.04, Steps 1-4, to access SEAWATER RING (Item 47).

Step 2

- Remove and replace SEAWATER RING (Item 47).



Seawater Ring (Item 47)

Step 3

- Reverse steps 1-4, in Section 6.04, to re-assemble.

END OF SECTION



REPLACEMENTS

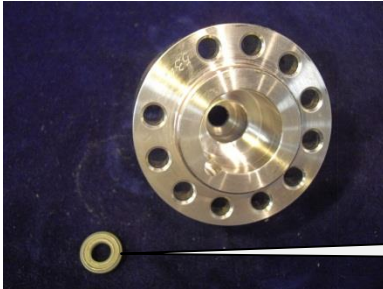
6.04d REPLACEMENT: Stem Cup Seal

Step 1

- Follow Section 6.04, Steps 1-4, to access STEM CUP SEAL (Item 28).

Step 2

- Remove and replace STEM CUP SEAL (Item 28).



Stem Cup Seal (Item 28)

Step 3

- Push STEM CUP SEAL (Item 28) into place **after** STEM (Item 10) is re-installed.

Step 4

- Reverse steps 1-4, in Section 6.04, to re-assemble.



NOTE

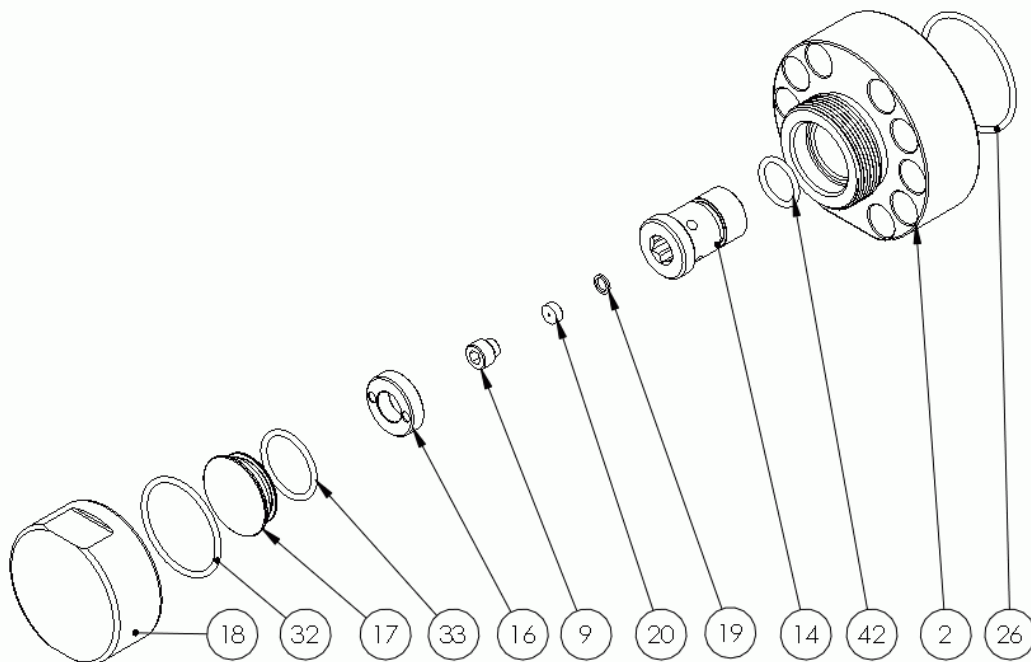
To ensure that STEM CUP SEAL (Item 28) is properly installed, use special Cup Seal Tool (Part 00000009-1010-000) (Ref. Appendix A).

END OF SECTION



WARNING

**REMOVAL OF LOWER SEAT HOLDER FROM VALVE WILL
CAUSE LOSS OF CALIBRATION
AND
THE VALVE WILL NOT FUNCTION PROPERLY UNLESS
RE-CALIBRATED BY FACTORY TRAINED PERSONNEL.**



**Lower seat removal by non-factory trained personnel
will void any implied or stated warranty.**

REPLACEMENTS

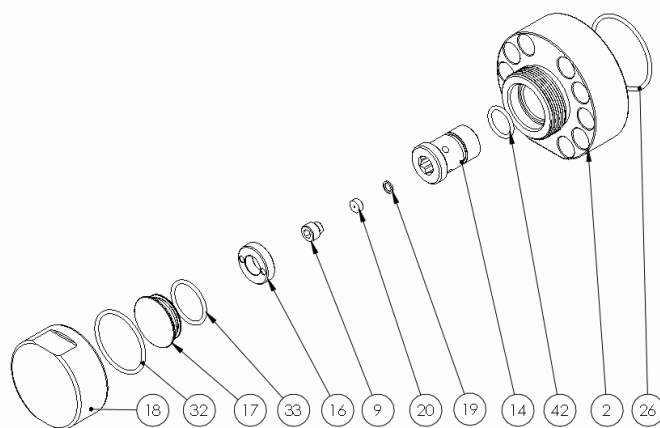
6.05 REPLACEMENT: Lower Seat Holder and/or Lower Seat Holder O'Ring



CAUTION

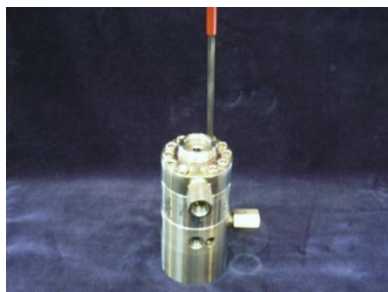
Use care NOT to scratch interior surface of LOWER SEAT HOLDER (Item 14) as this will cause valve to become inoperable.

OUTLET BODY			
ITEM	PART	DESCRIPTION	QTY
2	00000125-0301-001	Outlet Body	1
9	00000094-0301-001	Seat Retainer	1
14	00000142-0301-000	Lower Seat Holder	1
16	00000153-0301-000	LSH Lock	1
17	00000144-0301-000	Access Plug	1
18	00000145-0301-000	Cap Closure	1
19	00000092-0301-002	Seat Seal	1
20	00000093-0301-XXX	Upper Seat	1
26	00001555-2028-103	Body O-Ring	1
32	00001555-2024-000	Cap Closure O-Ring	1
33	00001555-2018-103	Plug Access O-Ring	1
42	00001555-2014-003	Lower Seat Holder O-Ring	1
	00001555-2013-003	Lower Seat Holder Guide	1
➤ Also, Ref. Section 1.10			



Step 1

- To separate OUTLET BODY (Item 2) from CENTER BODY (Item 1), remove ten (10) M6x25 SHCS (Item 4) using a 5 mm T-handle hex key.



Step 2

- Using calipers, measure distance from top of LOWER SEAT HOLDER (Item 14) to top of OUTLET BODY (Item 2).



Calipers



NOTE

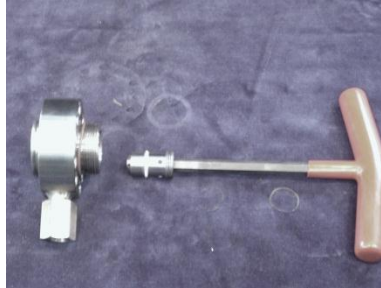
If available, a depth micrometer is more accurate and easier to use rather than calipers especially when re-assembling.



Depth Micrometer

**REPLACEMENTS****6.05 REPLACEMENT: Lower Seat Holder and/or Lower Seat Holder O'Ring, continued****Step 3**

- Using an 8 mm (or 5/16") T-handle hex key; thread LOWER SEAT HOLDER (Item 14) out of OUTLET BODY (Item 2) as shown below.

**Step 4**

- Remove and replace LOWER SEAT HOLDER O'RING (Item 42).

Step 5

- Re-assemble.
 - Use calipers (or depth micrometer) to ensure that LOWER SEAT HOLDER (Item 14) is at original height as measured in Step 2.

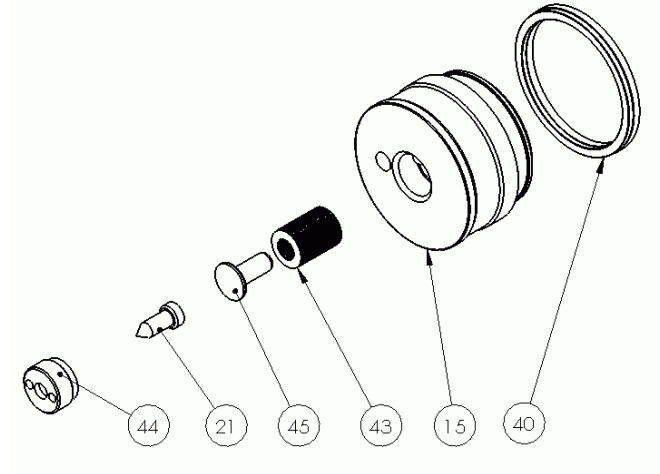
END OF SECTION



REPLACEMENTS

6.06 REPLACEMENT: Lower Pin

LOWER PISTON			
ITEM	PART	DESCRIPTION	QTY
15	00000140-0301-000	Lower Piston	1
21	00000054-0301-XXX	Lower Pin	1
40	00000146-0301-002	Piston Cup Seal	1
43	00001997-0301-000	Lower Piston Spring	1
44	00000549-0301-000	Lower Piston Pin Enclosure	1
45	00001923-0301-000	Lower Pin Spacer	1
➤ Also, Ref. Section 1.11			

**Step 1**

- The LOWER PIN (Item 21), located in the LOWER PISTON (Item 15), is accessed by removing PIN ENCLOSURE (Item 44).

Step 2

- Placing the Lower Piston Tool (Part 00000549-1012-000) (Ref. Appendix A) into the fluid port on side of LOWER PISTON (Item 15) will prevent rotation.

Ref. PICTURE 1 & 2



PICTURE 1



PICTURE 2

END OF SECTION



RE-ASSEMBLY

SECTION 7: RE-ASSEMBLY

7.01 VALVE RE-ASSEMBLY: Upper Body

In general, to reassemble valve simply reverse order of disassembly.

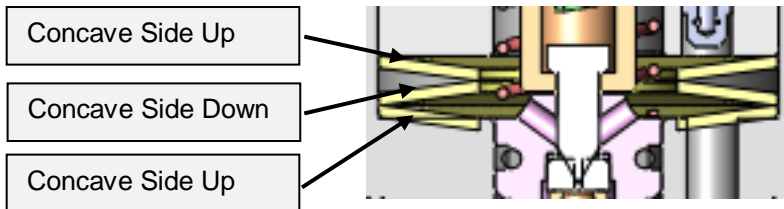
- **HOWEVER**, special attention should be taken in following area(s):

Step 1

**CAUTION**

Incorrect order of springs will cause valve to perform poorly.

- Ensure UPPER BELLEVILLE SPRING (Item 8) stack assembly is properly positioned within CENTER BODY (Item 1). Ref. PICTURE1
 - There are a total of three (3) springs.
 - Order of UPPER BELLEVILLE SPRINGS (Item 8) should be stacked concave to concave.

**PICTURE1****NOTE**

Placement of springs.


Step 2

- Attach UPPER BODY (Item 3) to CENTER BODY (Item 1).
 - These must be assembled so they remain in cylindrical alignment.



Failure to observe caution here can cause permanent damage.

Step 3

-  **CAUTION:** Several Items must be in proper alignment to not damage any components:
 - SLIDER (Item 12) and UPPER PISTON (Item 6) screw together so they are in middle of travel range.
 - ANTI-ROTATE PIN (Item 37) aligned with groove in UPPER BODY (Item 3).
 - STEM (Item 10) aligned with hexed slot in SLIDER (Item 12).
This is accomplished by temporarily attaching ADJUSTMENT KNOB (Item 53) to STEM (Item 10) and rotating until stem hex and slider hex slip together.

**7.01 VALVE RE-ASSEMBLY: Upper Body, continued**

Step 4



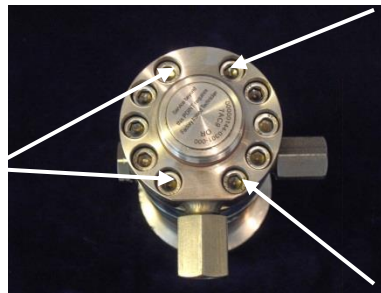
Failure to observe caution here can cause permanent damage.

- Slightly cross tighten ten (10) M6 X 25 SHCS (Item 4), beginning with four as shown below.

**IMPORTANT**

This is very important in order to prevent binding.

Start-up screws for cross tightening



- Once cross tightened, tighten all ten (10) M6x25 SHCS (Item 4) to a torque setting of 120 inch lbs. (13.6N.m).

END OF SECTION



RE-ASSEMBLY

7.02 VALVE RE-ASSEMBLY: Outlet Body**Step 1**

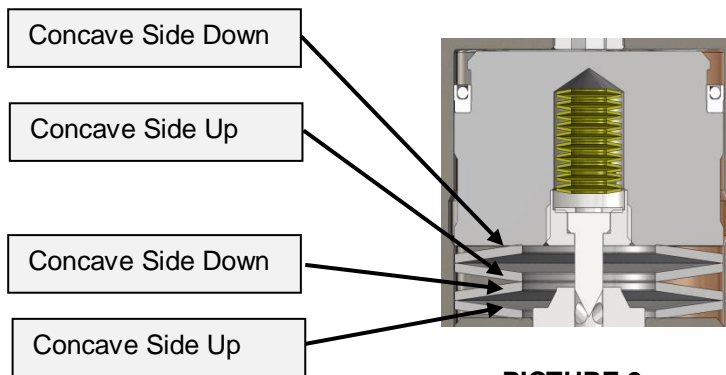
- When re-assembling OUTLET BODY (Item 2) to CENTER BODY (Item 1):
 - Care must be taken to not damage LOWER PIN (Item 21).
 - The two body sections must be positioned square to each other in order to not bind LOWER PIN (Item 21) and LOWER SEAT HOLDER (Item 14).

Step 2**CAUTION**

Incorrect order of springs will cause valve to perform poorly.

- Order of LOWER BELLEVILLE SPRINGS (Item 8) should be stacked concave to concave.
 - There are a total of four (4) springs.

Ref. PICTURE 2



PICTURE 2

**NOTE**

Placement of springs.

Step 3

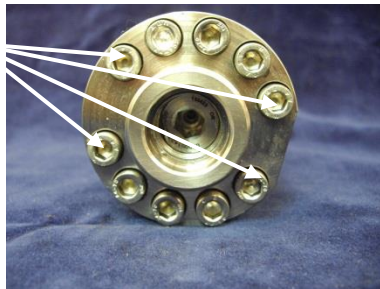
Failure to observe caution here can cause permanent damage.

- Slightly cross tighten ten (10) M6 X 20 SHCS (Item 5), beginning with four as shown below.

**IMPORTANT**

This is very important in order to prevent binding.

Start-up screws for cross tightening.



- Once cross tightened, tighten all ten (10) M6x20 SHCS (Item 5) to a torque setting of 120 inch lbs. (13.6N.m).

END OF SECTION



TROUBLESHOOTING

SECTION 8: TROUBLESHOOTING

There are a variety of reasons that can cause **Amflow®** Valves to perform poorly or not work. Listed below are those most commonly encountered:

- a. Springs installed incorrectly
- b. Defective Upper Piston Seal
- c. Defective Lower Piston Seal
- d. Defective Slider Seal
- e. Plugged Orifice
- f. Clogged Filter
- g. Isolation Valve in wrong position
- h. Check Valve failure
- i. Viscosity of Media too high
- j. Defective Upper Seat Seal
- k. Differential Pressure across valve set improperly
- l. Trapped air
- m. Upper Pin broken
- n. Lower Pin broken

PROBLEM	PROBABLE CAUSE
No flow though valve	e, f, g, h, m
Flow rate will not stabilize	a, b, c, d, j, k, l, n
Adjustment Knob feels “rough” when turned	j
Maximum flow rate not achievable	a, e, f, i
Slow drift downwards in flow rate	b, d, l, n

ADDITIONAL COMMENTS

NO FLOW -OR- REDUCED FLOW FROM VALVE	CORRECTIVE ACTION
DEBRIS IN JET ORIFICE	<ul style="list-style-type: none"> ➤ Remove UPPER PISTON SUB-ASSEMBLY. <ul style="list-style-type: none"> • Check for visual debris. ➤ Clear any visual debris. <ul style="list-style-type: none"> • Use compressed air to clear any debris in JET ASSEMBLY. ➤ If problem persists, <ul style="list-style-type: none"> • Replace UPPER PISTON SUB-ASSEMBLY (PART: 00000549).
BROKEN UPPER SLIDER PIN	Replace UPPER SLIDER PIN (PART: 00000054).
BROKEN LOWER PISTON PIN	Replace LOWER PISTON PIN (PART: 00000054).
DEBRIS BLOCKING UPPER SEAT	To clear UPPER SEAT debris or physically remove debris, ➤ use PURGE PORT to clear debris.
DEBRIS BLOCKING LOWER SEAT	Physically remove debris.
*NOTE: A complete dis-assembly of VALVE and flushing out of all passageways may be required to clear debris.	

TROUBLESHOOTING

FLOW RATE FLUCTUATION	CORRECTIVE ACTION
CHIPPED LOWER SEAT	Replace LOWER SEAT and LOWER SEAT SEAL : LOWER SEAT (PART: 00000093). SEAT SEAL (PART: 00000092).
CHIPPED LOWER PISTON PIN	Replace LOWER PISTON PIN (PART: 00000054).
TRAPPED AIR IN SYSTEM	Clear trapped air by; ➤ use PURGE PORT to clear. and/or ➤ run VALVE fully open for a few minutes to clear remaining air in VALVE .
DEFECTIVE UPPER SLIDER O-RING	Visually inspect UPPER SLIDER O-RING for damage. ➤ If damaged; replace UPPER SLIDER O-RING (PART: 00001555-2011).
ADJUSTMENT HANDLE TURNS ROUGHLY	CORRECTIVE ACTION
DEFECTIVE UPPER PISTON CUP SEAL	Visually inspect UPPER PISTON CUP SEAL for damage. ➤ If damaged; replace UPPER PISTON CUP SEAL (PART: 00000146-0301-002).
DEFECTIVE UPPER SLIDER O-RING	Visually inspect UPPER SLIDER O-RING for damage. If damaged; replace UPPER SLIDER O-RING (PART: 00001555-2011).

END OF SECTION



APPENDIX A AMFLOW® TOOLS



Part: 00000009-1010-000
CUP SEAL TOOL

Used to assemble Stem Cup Seal & Center Body



Part: 00000549-1012-000
LOWER PISTON TOOL

Used to change Pin or Lower Piston Spring



Part: 00000171-1010-000
SEAT HOLDER SEAL TOOL

Used to insert O-Rings on Upper and Lower Seat Holders



Part: 00000212-1012-000
STEM INSERTION TOOL

Used to install and remove stem and seat assemblies



Part: 00000153-1012-000
LSH LOCK TOOL

Used to install LSH Lock in Outlet Body



Part: 00000142-1113-000

DIFFERENTIAL ADJUSTING TOOL

Used to adjust low-end differential pressure

APPENDIX

Part: 00000129-1012-000
STEM RETAINER REMOVAL TOOL
Used to remove stem retainer



Part: 00000126-1010-000
SLIDER O'RING TOOL
Used to install slider o'rings

Part: 00000171-1010-000
SEAT HOLDER SEAL TOOL



Part: 00000126-1010-000
SLIDER O'RING TOOL

**NOTE:**

Contact manufacturer or manufacturer's representative to purchase specialized tools.

END OF SECTION

STANDARDS

A&H Enterprises designs its products to meet the applicable **ASME**, and **API** standards for valve design and pressure vessels.

Products are also **CE** marked and **ATEX** approved for Hazardous area installations.

MEMBERSHIPS



CERTIFICATIONS

ATEX DIRECTIVE (94/9/EC)

In the interest of safety and quality, A&H Enterprises has certified its **Amflow®** series of valves for use in potentially explosive atmospheres as defined by the ATEX Directive (94/9/EC) as Category 2G.

ATEX	
CE Ex II 2 G Ex d IIC T3	
US PATENTS 5,427,139 * 5,494,070 * 6,189,564,B1	EU PATENT 1110132

To ensure the safety of all parties, the valves must be regularly checked for signs of fluid leaks. Only genuine **Amflow®** parts must be installed in accordance with supplied instructions, good engineering, and construction practices. The valve bodies are constructed from 316L and, therefore, must not be used with chemicals which are incompatible with 316L or with the seal materials used. The valves must not be modified in any way from the original purchased valves. The valves must only be operated in the range of pressure and temperature conditions indicated on product data sheet. This equipment is certified for Group 2 Category II. Equipment should not be used in systems requiring a higher level of certification.



LIMITED WARRANTY

Each **Amflow**® product is warranted to be free from defects in material and workmanship under normal use and service. The warranty period is three (3) years and begins on the date of original purchase. This warranty extends only to the original buyer and does not apply to any product which, in A & H Enterprises' opinion, has been misused, altered, neglected, contaminated, damaged by accident or abnormal conditions of operation or handling.

At A & H Enterprises' option, the A & H Enterprises' warranty obligation is limited to the replacement or repair of a defective product that is returned to A & H Enterprises within the warranty period. Merchandise returned to A & H Enterprises within the warranty period which, in A & H Enterprises' opinion, is defective by accident, improper operation or improper handling shall be subject to a charge for repair. Merchandise, free from defects, returned to A & H Enterprises shall be subjected to a 20% restocking fee within thirty (30) days of the purchase date. Written authorization is required for all merchandise returned to A & H Enterprises.

To obtain warranty service, contact A & H Enterprises to obtain return authorization information. Then send the product to A & H Enterprises with a description of the difficulty, transportation and insurance prepaid. A & H Enterprises assumes no risk for damage in transit. Following warranty repair, the product will be returned to Buyer, transportation and insurance prepaid. If A & H Enterprises determines that failure was caused by neglect, misuse, contamination, alteration, accident, or abnormal condition of operation or handling, A & H Enterprises will provide an estimate of repair costs and obtain authorization before commencing the work. Following repair, the product will be returned to the Buyer, transportation and insurance prepaid, and the Buyer will be billed for the repairs and the return transportation and insurance charges.

THIS WARRANTY IS BUYER'S SOLE AND EXCLUSIVE REMEDY AND IS IN LIEU OF ALL OTHER WARRANTIES, EXPRESS OR IMPLIED, INCLUDING BUT NOT LIMITED TO, ANY IMPLIED WARRANTY OR MERCHANTABILITY OR FITNESS FOR A PARTICULAR PURPOSE. A & H ENTERPRISES SHALL NOT BE LIABLE FOR ANY SPECIAL, INDIRECT, INCIDENTAL OR CONSEQUENTIAL DAMAGES OR LOSSES, ARISING FROM ANY CAUSE OR THEORY.

Since some countries or states do not allow limitation of the term of an implied warranty, or exclusion or limitation of incidental or consequential damages, the limitations and exclusions of this warranty may not apply to every buyer. If any provision of the Warranty is held invalid or unenforceable by a court or other decision-maker of competent jurisdiction, such holding will not affect the validity or enforceability of any other provision.

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